HANDBOOK

OF

COMMERCIAL GEOGRAPHY

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BY

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EIGHTH EDITION

NEW IMPRESSION

LONGMANS, GREEN, AND CO.
39 PATERNOSTER ROW, LONDON
NEW YORK, BOMBAY, AND CALCUTTA
1913

BIBLIOGRAPHICAL NOTE

First Edition, August 1889; *Reprinted with corrections, May* 1890. *New Edition revised, May* 1892; *Reprinted January* 1894; *October* 1896; *May* 1899 *June* 1900: *March* 1901; *April* 1902. *Fourth Edition, revised throughout and greatly extended,* 1903. *Fifth Edition,* 1904. *Sixth Edition,* 1906. *Seventh Edition, revised throughout and extended,* 1908. *Eighth Edition, revised throughout and extended,* 1911; *reprinted July* 1913.

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PREFACE

TO

THE EIGHTH EDITION

The only important extension in this edition consists in the insertion of pars. 48 to 66*b* of the Introduction, paged in roman numerals, reviewing the more important changes affecting Commercial Geography since the date of the previous paragraphs of that Introduction and adding some further notes on the statistical Appendix. Three tables have been deleted in that Appendix for the reason stated in par. 66*a*. A few tables have been added to the Appendix, but for the most part the Appendix remains as in the last edition, this work not being a year-book, and the data not being yet available for a new quinquennial period corresponding to those given.

I have again to thank Miss E. J. Hastings, not merely for assistance in the calculation of tables, but also for the persevering and painstaking way in which she has independently prosecuted various inquiries that have arisen in the preparation of this edition.

GEO. G. CHISHOLM.

Edinburgh: *November* 21, 1910.

PREFACE

TO

THE SEVENTH EDITION

The principal extension in this edition has been due to the insertion of the chapter on Trade Routes (pp. 539–556), with the accompanying maps showing express and transcontinental railway routes in Europe, Eurasia, and North America, and that of Ocean Traffic in the pocket. The first three of these have been specially prepared for this edition. For permission to insert the fourth I am indebted to the kindness of the compiler, my friend Dr. Max Eckert, Professor of Geography in the Royal Technical High School, Aachen, author of the well-known *Grundriss der Handelsgeographie*, and to the publishers of *Globus*, in which this map originally appeared (Vol. 88, 1905).

Data being now obtainable for values of exports and imports for a new quinquennium belonging to the series in the earlier parts of the appendix, the figures for 1896–1900 given in the three previous editions have been replaced (pp. 600–616) by those for 1901–5. In general the rule has been followed of making the figures in these new tables directly comparable with those for the earlier periods so far as the leading items of import and export correspond. But this rule has not been strictly adhered to even when the data allowed of it. For example, the new classification of commodities in the British statistics of external trade made it in some cases seem more advisable to make a new group to facilitate comparison with future returns than to retain a less interesting group, even though it allowed of direct comparison with entries for former periods. Under the heading 'Woollen manufactures and yarns,' flocks, shoddy mungo, &c., tops, and alpaca and allied yarns were all omitted, but they are now included. These in 1905 formed 18 per cent. of the total value of Woollen manufactures

and yarns, which may serve as some indication of how far the new total is from being comparable with previous totals. The separate entry of 'Woollen tissues,' however, corresponds exactly with the former entry of 'Woollen manufactures' apart from yarn. The imports of wood are now the total imports, not merely hewn and sawn wood as formerly. Hides, skins, and furs are now grouped together. The new classification has allowed of the introduction of two new and interesting entries, Chemical and Electrical goods, the latter, however, only from 1903. In former periods all the Australasian colonies are grouped together in the British tables of origin and destination. The formation of the Australian Commonwealth was an obvious reason for distinguishing the Commonwealth from New Zealand.

For the preparation of these new tables I am indebted to Miss E. J. Hastings.

The three volumes which have now appeared distinguishing the 'consignment' from the import and export trade of the United Kingdom throw much more light on some of the features of British trade than could be got from the only returns formerly published, and for that reason a few paragraphs and notes relating to that subject have been added (pp. 601–2, pars. **600*b***, **607*a***, **624*a***, &c.).

No change has been made in the town populations of France and Germany in consequence of the new censuses of 1906 and December 31, 1905, respectively. The object of giving these populations is to allow of a rough comparison of the relative importance of towns in different parts of the world, and as in most other cases the populations are based on returns about 1900, it would be misleading to introduce in these two cases returns of a later date. It may be here mentioned, however, that in France the round numbers adopted to give the results of the census returns of 1901 would serve almost equally well in many cases for those of 1906. Some of the large towns have even gone back in population. Lille lost 5,000, Roubaix 8,850, between the two censuses. In nearly all the large towns of Germany, however, the rapid growth of previous periods was shown by the 1905 census to have been continued.

As interesting illustrations of the way in which invention is constantly altering the values of places, attention may be drawn to two of the minor changes in this edition. On p. 198 mention is made of the large production of sulphur in Louisiana. The subterranean deposits had long been known to exist there, but they were valueless because there was no process for making them economically available.

This was changed when the Frasch process of forcing down hot water to melt the sulphur and then forcing up the melted sulphur by compressed air was proved practicable. On p. 339 mention is made of the use of water-power derived from the Pescara in the eastern Apennines in manufacturing carbide of calcium for the preparation of calcium cyanamide as a manure according to the process devised by Professor Adolph Frank and Dr. Caro of Charlottenburg. This process is now giving a new value to water-powers in many parts of the world where the power is sufficient in amount and the situation otherwise suitable to make the process economic.

There is one omission in this edition to which reference must be made. All the maps showing density of population have been dropt. These maps, while still, indeed, for the most part presenting a sufficiently faithful picture of the general distribution of population, had ceased to be accurate in many details. To bring them up to date would have involved much time and labour, and it appeared on the whole to be better to devote that labour to the preparation of the maps that now appear for the first time and bringing the other maps up to date.

Finally, I have much pleasure in expressing my thanks to the printers for their care in seeing to the corrections of cross-references necessitated by the repaging of the appendix and for their vigilance in other particulars.

GEO. G. CHISHOLM.

July 7, 1908.

NOTE TO THE SIXTH EDITION

Since the publication of the fifth edition the creation of the two Canadian provinces of Saskatchewan and Alberta has necessitated a rearrangement and a partial rewriting of the matter on pp. 472 and 473 and alterations in the map facing p. 472, which has in other respects been brought up to date. The railway maps of Russia in Asia, South-Eastern Asia, and South Africa have also been brought up to date, and the map of the German Waterways has been altered so as to show the effect of the legislation of 1905. On the map of the World a few of the more instructive sailing-ship routes have been added. In this edition it has been possible to give, for the first time, statistics of the commerce of the Australian Commonwealth as a whole, and new tables have accordingly been furnished, and the paragraph on Australian commerce on p. 529 has been rewritten. The other changes in this edition are merely in small details.

GEO. G. CHISHOLM.

59 Drakefield Road, Upper Tooting, S.W.
September 20, 1906.

NOTE TO FIFTH EDITION

The changes in this edition are comparatively slight. Most of them are in the sections on America, and for the greater number of the emendations in those sections I am indebted to my friend Mr. J. Russell Smith, Instructor in Commerce, Wharton School, University of Pennsylvania, Philadelphia. Elsewhere the principal alteration has been in paragraph **581***a* on the German iron industry. The changes now mentioned as affecting the development of that industry since 1879 are those on which special stress is laid in *Die Störungen im deutschen Wirtschaftsleben während der Jahre* 1900 *ff., Zweiter Band, Montan- und Eisenindustrie* (Leipzig : Duncker und Humblot, 1903), the result of an inquiry into the recent depression in German industry made by the *Verein für Socialpolitik*; but it is not to be denied that the causes there mentioned have been assisted in their operation by the fiscal policy followed in Germany since 1879. The new maps are in illustration of the remarks on hinderlands in pars. **115–115***b*, and the new diagrams of those on the climate of Canada and New Zealand as compared with other parts of the world in pars. **699**, **858**, and **962***e*.

GEO. G. CHISHOLM.

July 25, 1904.

PREFACE

TO

THE FOURTH CORRECTED EDITION

ELEVEN years have passed since the appearance of the last corrected edition of this work. During the greater part of the interval I have been engaged in lecturing on the subject of which it treats, and my experience in that capacity is the cause of the chief difference between this and the previous editions. That experience has brought home to me the degree to which the value of geographical conditions is altered by the circumstances of the time, and for that reason new paragraphs have been added throughout the present volume indicating briefly the connection between Commercial Geography and Commercial History. In these days of rapid movement a period of eleven years has been long enough to illustrate this influence in many ways. The constant efforts after commercial expansion have led to the rapid development of many parts of the globe, where newly discovered resources or new means of utilising resources already known have given a new value to the local conditions. It is from this cause that many pages of the previous edition have had to be entirely re-written.

In the preparation of the present edition I am indebted for help chiefly to two assistants. Mr. J. A. P. Mackenzie, Librarian to the Royal Statistical Society, has compiled for me all the new statistical tables, and the diagram (V) showing the production of iron and iron ore in the United Kingdom, the United States, and Germany, and has furnished me with much other statistical information. For more varied assistance I owe my thanks to Miss J. B. Reynolds, B.A. (Lond.), holder of a diploma from the Oxford School of Geography. The numerous new maps prepared for this edition by Messrs. G. Philip and Son have been based on instructions drawn up by her. She has also compiled most of the new diagrams, has drawn up

the index and the table of contents, has procured for me information on various points, and above all she has read every page of the proofs, verified all the cross-references, detected many oversights, and enabled me to remove many obscurities. For minor assistance I am indebted to Miss E. J. Hastings. Mr. Thomas Ellison of Liverpool, author of the *Cotton Trade of Great Britain* and of the statistical reviews of the cotton trade issued at short intervals, has been good enough to read and correct the proofs of the sections dealing with cotton, and I am indebted for a similar service to Mr. Douglas Hamilton of Bradford in the case of the sections relating to wool and the woollen and worsted industries. Mr. Theodor Bernet of Bern, a former student, has read with minute care the proofs of the section on Switzerland, and my friend Mr. T. Kirkup, author of a *History of Socialism* &c., has read those of the greater part of the Introduction to the Fourth Edition. Lastly, I have pleasure in acknowledging the benefit that the work has derived from the vigilance of the readers of the printers, Messrs. Spottiswoode and Co.

GEO. G. CHISHOLM.

July 8, 1903.

PREFACE

TO

THE THIRD EDITION

THE most extensive changes in the present edition of this work are those necessitated by the arrangements for the partition of Africa made since the first edition passed through the press. The pages devoted to this part of the world have, in consequence, had to be re-written; but elsewhere the text has been interfered with as little as possible, new matter being added, where practicable, in the form of notes, so as to facilitate comparison with the first edition. The statistics, both in the body of the book and in the appendix, have been brought up to date where the material was available to me for doing so on the plan adopted in the first edition; but in certain cases figures have been left unaltered, when figures for later years, though accessible, would have had precisely the same significance as those originally given. The proofs of the Indian section have been kindly revised for this edition by Col. Sir James Johnstone, formerly Political Agent at Manipur.

Since the appearance of the first edition I have noticed many indications of the prevalence of what seems to me a mistaken idea of the scope of a volume on Commercial Geography. Many appear to think that the main function of such a work is to furnish information as to new profitable markets. Now I do not question that geographical studies may help greatly in arriving at such information; but the studies carried on with this view must be minute and exhaustive. To comprehend the whole world in such a survey would require an encyclopædia, not a volume. A volume dealing with the subject must, it seems to me, be essentially educational. Its function is to make the mind active and suggestive in matters connected with one's business. The benefit derived from its study is indirect. But the importance of such indirect benefits no one who has reflected on education will be inclined to underestimate. In treating of a cognate topic, Prof. Marshall, in his *Principles of Economics*, writes as follows:—'It must be admitted that the chief benefits which the ordinary workman derives from a good education are indirect. It stimulates his mental activity; it fosters in him a habit of wise inquisitiveness; it makes him more intelligent, more ready, more trustworthy in his ordinary work; it raises the tone of his life in working hours and out of working hours; it is thus an important means towards the production of material wealth, at the same time that, regarded as an end in itself, it is inferior to none of those which the production of material wealth can be made to subserve.' I venture to think that these words are equally applicable, with the necessary changes, to a large part of commercial education, and in particular to the study of Commercial Geography.

GEO. G. CHISHOLM.

London: *April* 1892.

PREFACE

TO

THE FIRST EDITION

THIS book is designed to meet a want recognised by all who are interested in adapting our education to the needs of the time.

Since its commencement several works have appeared which seek to accomplish a similar object by methods different from those adopted in the present work. A few words of explanation as to the plan here followed are therefore all the more necessary.

I cannot better explain the aim of the work than by adopting the words of Mr. Goschen in the address which he delivered to the students of Aberdeen University on his installation as Lord Rector (Jan. 31, 1888). I have endeavoured to impart an 'intellectual interest' to the study of the geographical facts relating to commerce. It will, I imagine, be generally admitted that Mr. Goschen has not overrated one whit the importance of this intellectual interest with a view to practical success in business; and it is a consideration by no means to be ignored that in following this road to practical success we give to life one of the elements that make success valuable.

To say that in the present work I have endeavoured after intellectual interest is only another way of saying that it has been my aim to make the book really educational. In writing the work I have had three classes chiefly in view—first, teachers who may wish to impart additional zest to their lessons in geography from the point of view of commerce; secondly, pupils in the higher schools and colleges that are now devoting increased attention to commercial education; and thirdly, those entering on commercial life, who take a sufficiently intelligent interest in their business to make their private studies bear on their daily pursuits.

From what has just been said about the aim of the work, it follows that this book is not to be regarded as a general work of reference on all that may be included under the head of Commercial Geography. It is not a mere repertory of the where and whence of commodities of all kinds. My wish has been to throw light on the vicissitudes of commerce by treating somewhat fully of the trade in the

more important commodities, and emphasizing the broad features of the trade of different countries, not to encumber the book with a multitude of minute facts. In the selection of details for mention I have sought to single out those which are most significant, and most obviously significant, and it is not so much the details themselves as their significance which it is desirable to impress on the memory.

The general arrangement of the work is shown by the Table of Contents. The sections under the head of Commodities may be regarded as substantially a commentary on the *Annual Statement of the Trade of the United Kingdom with Foreign Countries and British Possessions*, which forms a nearly complete synopsis of the trade of the world. It is this publication that is frequently referred to simply as the 'Annual Statement' or the 'Annual Statement of British Trade.' In drawing up this commentary, a brief sketch of the leading processes of manufacture has been given, for reasons that hardly need to be pointed out. These processes have often, as in the case of iron, an important bearing on the geographical distribution of industry. Moreover, there can be no intelligent interest in trade without an understanding of the reasons why certain commodities are produced and exchanged at all, and in many cases the explanation of this involves the knowledge of manufacturing processes. Take, for instance, the first article entered in the 'Annual Statement' just referred to under the head of both Imports and Exports—'alkali.' What interest can there be in this article of trade for those who have no knowledge of the relation of 'alkali' to such familiar commodities as glass and soap? It is manifest, too, that the interest of this trade is much heightened when we consider its connection, more or less direct, with the trade in salt, nitrate of soda, sulphur, sulphuric acid, lead, bleaching powder, and other commodities.

This illustration serves to show how closely interconnected are many of the facts belonging to the domain of commercial geography. It is for the sake of bringing this into prominence that the present work has been divided into numbered paragraphs, to facilitate cross-reference. Such references are made by printing the number of the paragraph referred to in bold type, thus (**275**).

With regard to the arrangement of commodities depending directly or indirectly on climate, under the heads Products of the Temperate Zone, Sub-Tropical and Tropical Products, I need hardly point out that no hard and fast line can be drawn between the different groups. Commodities have been entered under the heading which refers them to the region in which they are produced commercially in greatest quantity, and in which accordingly they are most characteristic; but it must not be inferred that there is any absolute limitation in any case to one climatic zone.

The separate treatment of commodities and countries has involved in some cases a certain amount of repetition, but it must be remembered that the same facts are in effect different when regarded from different points of view. It may here be explained that generally under the head of Commodities only the relative rank of countries as a whole in the production of, or trade in, certain articles is considered, the local distribution of industries in particular countries being reserved for treatment under the head of the countries to which they belong. An exception is made in some cases in which local characteristics are an essential part of the explanation of the predominance of any particular country.

As regards statistics, it will be observed that there has been greater anxiety to make figures instructive than to furnish the latest figures procurable. In a work not designed as a year-book, the main thing is to make the figures so far as possible comparable with one another. My chief aim in the collection of statistics has been to illustrate tendencies in progress. In the body of the book the statistics given under the head of Commodities are mostly of quantities. In the general tables in the appendix showing the commerce of different countries of the world for certain periods, I have been obliged to use the only common measure available, that of value, with all its defects. It is necessary, however, to warn the reader that in consulting these tables the great defect pointed out in par. 133, and illustrated by the figures on pp. 618–9, ought never to be left out of mind. In making use of these statistics in the body of the book I have endeavoured to do so in such a manner that what may be learned from them on the assumption of uniformity of prices is all the more manifestly true when actual changes in price are taken into account. In order to remove one of the defects attached to the use of values as measures for comparison—namely, the changes in the relative value of gold and silver or inconvertible paper—the tables have all been made to represent as far as possible gold values. In the case of countries in which a gold standard is not in use, the tables have been drawn up on the basis of the average gold value for each year of the actual currency, so far as the information at my disposal allowed. Further explanations on this head are given in notes to the tables themselves.

By adopting this course I do not mean to suggest that a more accurate representation is given of the rise and fall of trade in silver-using countries than would be afforded by tables drawn up on a silver basis. In the case of India, for example, it may be objected that the using of gold instead of silver values gives a wholly inadequate idea of the growth of Indian trade; but that is equally true of England (see the table compiled from the Report by Mr. Giffen, cited on p. 617). The

course in question has been adopted solely as affording a more accurate comparison between the commerce of different countries.

The plan of giving the average value of imports and exports for periods of five years has been resorted to with the view of showing more clearly the tendencies of commercial development. Such periods seemed long enough to mask what may be called accidental fluctuations from year to year, and at the same time they are short enough to show a number of successive stages in recent years.

The Maps introduced into this volume have been prepared by Mr. F. S. Weller, F.R.G.S. In those showing density of population and products, the names of products written in italics are those of the principal exports. The railway maps are intended chiefly to serve two purposes. Those of the parts of Europe where railways are abundant are designed to show the interruption to communication caused by mountain ranges. Those of parts of the world in which railways are still few are intended to show the lines along which traffic is already promoted by this means of communication, and the routes by which it is expected that traffic is most likely to be developed in the future by railway construction. The names of minerals and some other products which may be expected to assist in giving importance to projected railways are frequently added.

With reference to the material I have made use of in compiling the present work, I must in the first place express my indebtedness, direct and indirect, to British merchants and manufacturers. From my inquiries on the subject of commercial geography I certainly have not derived the impression that, if British commerce has in recent years advanced with less rapid strides than that of some other countries, geographical ignorance on the part of the British merchant can be set down as one of the principal causes. Much of my most interesting material has been drawn from mercantile sources. No single periodical has been of more use to me than the London *Chamber of Commerce Journal*. The interesting report of the *Bombay and Lancashire Cotton Spinning Inquiry*, instituted by the Manchester Chamber of Commerce, shows how thoroughly alive British merchants and manufacturers are to the geographical conditions that affect their business.

Among the general works to which I am indebted I owe most to Scherzer's *Wirthschaftliches Leben der Völker*. It is this work that is referred to when 'Scherzer' simply is cited as my authority. I have seldom been able to acknowledge the precise amount of my obligations to this book, and here I can only say in general terms that I owe more to it than would appear from a comparison of this compilation with the work referred to. The work cited by the name of Andree is the

Geographie des Welthandels, by Karl Andree, revised and completed by Rich. Andree. British and United States Consular Reports, the *Board of Trade Journal*, and the annual supplements to the *Economist* giving a review of the trade of the past year, have all furnished me with important information, and I have also derived much from articles and the numerous valuable notes in the *Scottish Geographical Magazine*, which has devoted special attention to this subject.

I am indebted to various gentlemen practically connected with different industries for their kindness in reading the proofs of the sections relating to these industries. I have also to thank my friend Mr. F. W. Rudler, of the Museum of Practical Geology, who has kindly read over the proofs of the section dealing with minerals; but my chief acknowledgments under this head are due to my friend Mr. T. Kirkup, author of *An Inquiry into Socialism* &c. It is to him that I owe the original suggestion of the work. He also kindly revised the first plan of the work three years ago, and the text owes innumerable improvements to his careful reading of the proofs of the more important sections. I have also to express my thanks to Mr. C. H. Leete, Fellow of the American Geographical and Statistical Society, for suggestions and corrections relating to the section on the United States, and to Mr. B. Daydon Jackson, one of the Secretaries of the Linnean Society, for his kindness in verifying the authors of species in the case of the scientific names of plants, which have been mentioned to facilitate identification so as to enable those who have access to a scientific library to obtain further information.

GEO. G. CHISHOLM.

London: *July* 1889.

CONTENTS

MAPS

DIAGRAMS

NOTE

Names of towns with more than a hundred thousand inhabitants are printed in bold capitals—thus, LIVERPOOL—but usually only where the most important reference to such towns occurs, and not where the population is otherwise indicated. Indian towns with a population above that number are distinguished on the map of India (opposite p. 380), and they are printed in capitals in the text only when a considerable notice of them is added.

Black figures in parentheses—thus, (275)—are references to paragraphs. Where paragraphs are subdivided into numbered sections the reference is made in this form (423·9), which means the ninth section of paragraph 423.

INTRODUCTION

TO

THE FOURTH AND EIGHTH CORRECTED EDITIONS

(Pars. 48–66*b* belong to the Eighth Edition)

1. One of the chief uses, if not absolutely the most important of all the uses of the study of Commercial Geography, is to enable us to form some reasonable estimate of the future course of commercial development, so far as that is governed by geographical conditions. Such an estimate must of course be based on one's knowledge of forces that can be seen in operation at the present time, and must be recognised as liable to be falsified by discoveries which it is impossible to foresee. The keenest and most widely informed have made forecasts which have proved to be utterly wide of the truth, but which could not be called unreasonable at the time. When Adam Smith wrote that 'the small quantity of foreign corn imported, even in times of the greatest scarcity, may satisfy our farmers that they can have nothing to fear from the freest importation' (*Wealth of Nations*, Book II. Chap. II.), it was not expected that any one should be able to foresee the ultimate consequences of the inventions of the ingenious young instrument maker whom Smith had befriended at Glasgow. When Dr. P. Colquhoun in his *Wealth of the British Empire* (2nd edition, 1815) demonstrated the utter inutility of the new British colony in Australia, even that can hardly be pronounced unreasonable in the light of the knowledge of the time. Such forecasts may serve to remind us of the tacit qualifications with which all attempts to anticipate the future are to be interpreted, but do not show the inutility of making such anticipations as the circumstances admit of.

2. In attempting such forecasts statistical data are unquestionably an important aid. One of the greatest advantages which the future may be expected to have over the present will consist in the greater accumulation of statistical data, and greater insight as to the kind of data to be collected and the method of handling them. In Commercial Geography the value of figures is two-fold. First, they help at any particular time to distinguish the important from the unimportant. Second, when we have figures for a series of years they direct attention to changes that have been in progress in the past, and may

thus serve to suggest the most fruitful branches of inquiry with reference to any geographical causes that may have contributed to such changes, and hence to estimate with more chance of success their probable action in the future. In both ways they serve as a guide to what is most worthy of examination in our special subject. In order that they may illustrate changes in progress it is obvious that the series are likely to be the more instructive the longer and the more continuous they are, and the more numerous those series are which are directly comparable one with the other. For that reason in the present edition of this work older figures have been left so far as practicable as they were in the last edition, and later figures added. In the appendix all the former tables, exports and imports, have been left as they stood in the edition of 1892, and new tables have been added, making it possible in most cases to observe the later progress of trade. For such a purpose diagrams are obviously even more useful than tables, but they require more room. In this edition, however, a few statistical diagrams have been inserted to illustrate points that seemed to be of special importance. Even apart from statistics there appeared to me to be an advantage in many cases in leaving a statement of facts as they were in past years, and drawing special attention to the changes that have since taken place. In many cases that is done in a brief foot-note, but in other cases it seemed to me most convenient to notice the changes alluded to in this introduction, to which a reference is added in the form of a foot-note where required.

3. Some of the most important changes that have taken place in the commerce of the world since the date of the first edition of this work (1889) have been in directions therein foreshadowed. In that edition it was contended that the tendency of commerce is to bring about a more equal distribution of industry all the world over, and to give more and more importance to purely geographical conditions (**20**), and the opinion was expressed with regard to our own country that while there was still room for expansion it was to be anticipated that that expansion would be at a slower rate. It may be useful to consider these views together in the light of one another and of subsequent events.

4. Since the publication of that edition there have been two censuses of the United Kingdom, and both have shown a decline in the rate of increase of population, even if we take Great Britain separately from Ireland, as is shown by the following figures :—

Rate of Increase, per cent. per annum

	1871-81	1881-91	1891-1901
England	1·37	1·11	1·04
Wales	1·12	1·11	1·22
Scotland	1·07	0·75	1·06

The rise in the rate of increase in Wales in the last period was

not enough to counterbalance the decline in the other two parts of Great Britain. This fact is in itself significant. Demands are constantly made for more men for our mercantile navy, for agriculture. and for various industries, while it is notoriously the case that more men are finding employment in the service of the rich and well-to-do, and in connection with amusement and education, including under one or other of these last two heads all the varied forms of literature. When such demands are made the population returns raise the question, Do the men exist to meet them?

5. The question still remains, however, why there should be a slower rate of expansion in our own country than formerly. For that there are no doubt many reasons, but it is only proper for us here to inquire whether any geographical reason can be assigned, and to answer this question it may be well to compare this country with other important manufacturing countries, such, for example, as the United States and Germany, in both of which the rate of increase of population is more rapid than in our own. Now it is an obvious consideration that the development of manufacturing or indeed any non-agricultural industries in any country involves the simultaneous development of agricultural industries somewhere; but it is now (unlike what it was in Adam Smith's time) a familiar fact that that answering agricultural development is no longer necessarily in the same country. In the United States, and even in Germany, the agricultural development in correspondence with that of manufactures is still mainly within the respective countries, but it is not so in our own country. With non-agricultural industries, therefore, growing at a merely equal rate to that at which they are growing in our own country, that fact in itself would account for a more rapid expansion of the population in both the countries named. In spite of economies in agricultural production the rate of increase of population is still most rapid in the great agricultural regions of the world.

6. But further, the expansion of population in a manufacturing country implies a greater and greater degree of centralisation in manufacturing industries. Now it is to be noticed that while undoubtedly there are forces constantly acting in the direction of such concentration, there are others of an opposite tendency. The centralising forces are necessarily those most in the public eye. Enlarging factories, more and more complicated and expensive machinery, improvements in handling and transport, the growing magnitude of industrial combinations, all tend of necessity to attract the general attention, and sometimes to get spoken of with bated breath in awestruck wonder. But it may be doubted whether the decentralising forces are not after all the stronger. There is good reason to suspect that the steadily growing strength of the decentralising forces is what urges on, perhaps rather too precipitately, the formation of those huge organisations that strike the imagination of the dullest. Our own

country is certainly one with a highly centralised manufacturing industry, but it is not the only one, and it may be worth while to consider the action of centralising and decentralising forces generally before returning to the consideration of the British Isles in particular.

7. First, we may note, as in favour of centralisation, the growing complexity of manufacturing processes, and the consequent demand for more complicated machinery and more highly skilled labour of all kinds. These things are to be met with solely in the most highly advanced manufacturing countries or regions. Such countries and regions accordingly tend to have a preponderating advantage in proportion to the complexity of the industry and the amount and degree of skilled labour involved. Hence under modern conditions the production of iron and steel, the manufacture of complicated machinery, and the chemical industries, are almost confined to such countries and regions, and in them tend to be highly centralised. Many of the changes of the last twelve years or so in connection with these industries have been of such a nature as to emphasise this tendency.

8. Improvements in the means of transport also tend on the whole towards centralisation. They tend to increase the advantages of a distant relatively to a nearer centre of production, which has previously had an advantage solely in consequence of greater proximity to the market. Within the last twelve years there has been continued improvement under this head, but it must be borne in mind that the improvements of that nature do not benefit different centres of production equally. This country being one that necessarily carries on all its external commerce by sea is most interested in improvements in ocean navigation; and it is at least probable that all the economies in ocean transport that have taken place in recent years through the enlargement of cargo vessels, the improvement of marine engines and boilers, the enlargement and improvement of harbours, and the improvement of the means of communication between the seaboard and the interior, have in the aggregate conferred more advantages on this country than any other. But even if this is true the significance of the qualification involved in the words 'in the aggregate' must not be overlooked. On the other hand, the improvement of the means of communication between inland centres of production and places that cannot easily be reached from the seaboard is obviously more in favour of those inland centres than of British seats of manufacture; and such improvements are constantly being effected by the extension of railways.

9. When railways are introduced into new lands adapted for the production of food and raw produce, that tends in a special degree towards the centralisation of manufactures. In the United States, the Canadian North-West, Argentina, Russia, and Siberia, the laying of railways in such regions has been steadily advancing, with the inevitable result of stimulating manufactures in different parts of the

world in which such industries already existed. Since the date of the last (corrected) edition the only entirely new region that has been thus opened up is Siberia.

10. Lastly, the progress of refrigeration and cold storage has also acted powerfully in the same direction. It has added to the value of new and distant lands by making articles of food available in remote markets which formerly were not so. The practice of refrigeration began even before the date of the first edition of this work. It was first tried, with more or less success, about 1875 in America. The freezing of mutton was attempted in Victoria and New South Wales towards the end of the seventies, but it then proved a failure. The trade in frozen mutton began in earnest in 1881. The principal market for all the producing countries has always been the United Kingdom, and in that year the import first exceeded 10,000 carcases (all from Australia). In 1890 the total import had risen to nearly 3,000,000 carcases of mutton and lamb, besides 76,000 quarters of frozen beef, and in 1901 to above 7,000,000 carcases of mutton and lamb, and 740,000 quarters of frozen, in addition to more than 3,000,000 cwts. of chilled beef. If it had not been for these supplies it is probable that the cost of living would have been greatly enhanced in this country, and a more or less serious check given to the development of our manufactures. The system, moreover, has extended to the trade in poultry, fish, fruit, milk, eggs, cheese, and butter, the trade in the last-mentioned article more particularly having been greatly extended thereby. Butter is now imported in enormous and increasing quantities from Victoria and New Zealand, Canada, Russia, and other distant countries,[1] the Russian largely of Siberian origin, though this, unfortunately, is not shown in theAnnual Statements of British Trade.

11. Turning now to the consideration of the decentralising forces affecting manufacturing industries, we should note, first, that in the countries in which such industries are first developed the resources most favourably situated for development, according to the circumstances of the time, are likely to be utilised first. In the case of coal, for example, the thickest and richest seams are those likely to be first used up. Unless, therefore, economies are effected in the method of working the mines, the cost of producing an equal quantity of coal is likely to become greater and greater. With respect to such resources these countries, to use the language of economists, are likely first to experience the operation of the Law of Diminishing Returns.

12. Further, the existence of local supplies of raw material, local labour, and a local market are always tending towards the establishment of local manufactures where such advantages exist. In the initial stages of the development of a region of raw production, local

[1] In 1901 more than 80 per cent. of the butter imported into the United Kingdom was derived from Australia, New Zealand, Russia, Canada, the United States, and the Argentine Republic.

labour and a local market count for little in the starting of manufactures utilising the raw material, but they may quickly come to do so if the region is already thickly peopled, and only the production of the particular raw material is new. The same is true of the development of regions rich in what has been for a hundred years the chief source of power, coal. In this case the cost of carriage, especially by land, greatly limits the range of utility of that material, and many deposits are known to exist which can have little or no value, at least under present conditions, until population is attracted from other causes, but when population is so attracted these deposits become rapidly more valuable.

13. It is to be noted, however, that in recent years the economic distribution of power has been greatly affected by the progress of invention, which has made sources of power commercially available that were not so before. This has been chiefly with the aid of electricity, and probably in no other direction has greater progress been made within the last ten or twelve years. When the great mechanical inventions connected with the textile industries were first introduced they were applied chiefly by means of water power. Afterwards this gave place, except under the most favourable conditions, to the more reliable steam power. The transmission of power originally derived from falling or rapidly flowing water by means of electricity has given value to many water powers which were formerly useless. Power has thus been transmitted in the United States a distance of 200 miles. In certain industries electricity, most frequently developed from water power, is already completely victorious over steam. These are the industries in which excessively high temperatures have to be produced, as in the smelting of aluminium ores [1] and the manufacture of carbide of calcium, or great resistances (including strong chemical affinities) have to be overcome, as in the grinding of wood to wood-pulp and the dissociation of elements in certain very refractory chemical compounds. It is to be noted, however, that where electric installations can be economically established for such purposes the power thus developed can then in many cases be utilised with advantage for other industries besides.

14. Electricity also promises to give a new importance to peat, which at present is of little industrial importance, but may in the near future be largely used for the production of electricity capable of being transmitted to places in which it may be economically turned to account. Other processes also have been devised by which it is hoped to convert peat into a form richer in heating power in proportion to its bulk and thus more capable of bearing the cost of carriage.

15. If now in the light of these general considerations we turn our attention specially to our own country, the first thing worthy of note is that our commerce during the last ten or twelve years has, on the

[1] Electricity first came to be of importance in metallurgy about 1879.

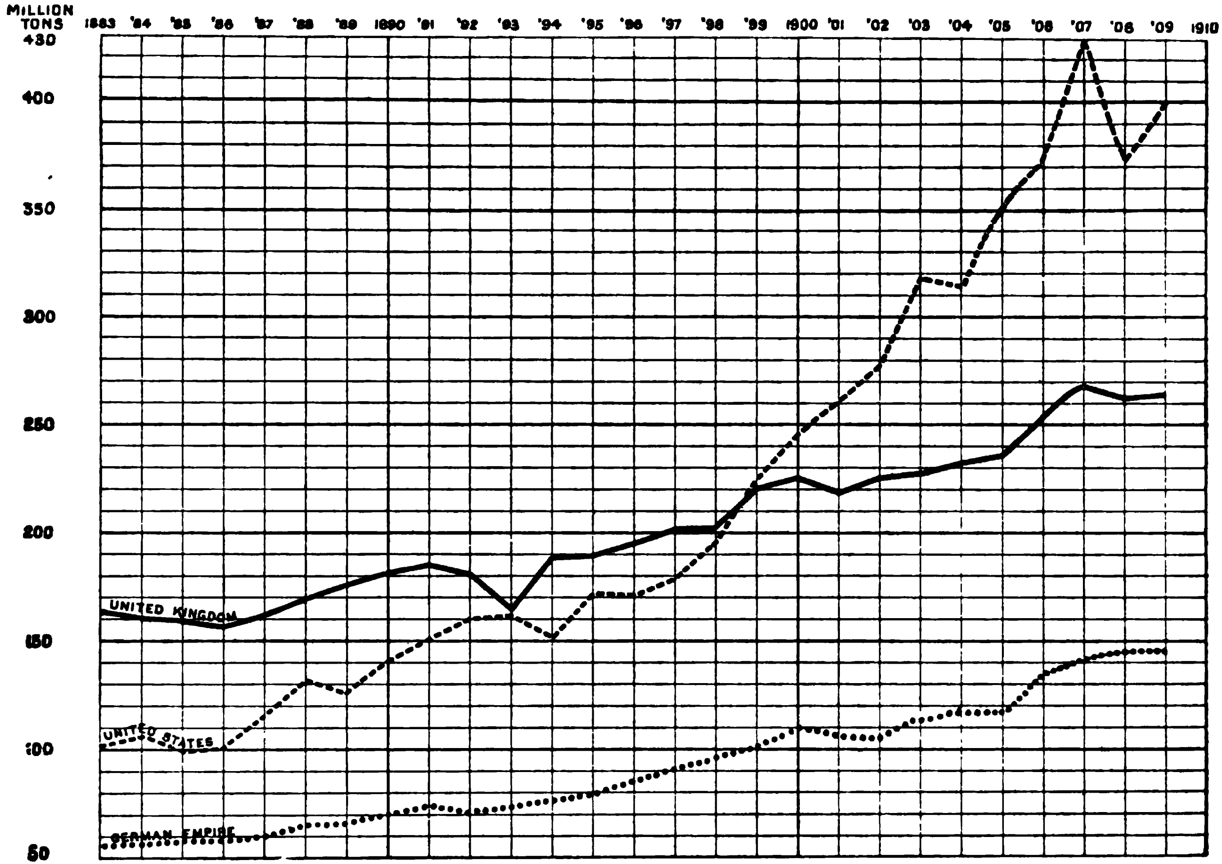


DIAGRAM I. COAL PRODUCTION SINCE 1883.

whole, still continued to increase. Some of our industries may have declined, but others have expanded in varying degrees, but none so much perhaps as our carrying trade. This is only what might have been expected in view of the steady increase of population and wealth in nearly all parts of the world, and the various improvements above referred to as likely to favour the external commerce of a country or region which carries on that commerce entirely (or even largely) by sea.

16. It is none the less true that the commerce of some other countries has expanded in the meantime even more rapidly, and among these it is natural for us to be specially interested in the growth of the greatest of our rivals in manufactures. The facts under this head may be easily collected from the tables in the appendix.

Our first diagram will serve to some extent to explain these facts, though it at the same time needs some explanation or comment. The diagram shows that both these rivals are rich in at least one of the great sources of power, and with reference to this fact it is unnecessary to repeat here the point insisted on in paragraph 506 of the body of the book. It shows also that in both countries the production of that source of power has been increasing more rapidly than at home, and the second diagram shows that the consumption of our rivals is increasing at a relatively even more rapid rate. Unquestionably that is partly due to the effect of protective tariffs designed to secure a home market for manufactured articles, but it is well to remember that it is not solely due to this circumstance. It is partly due to one or more of the several causes already mentioned as tending to favour decentralisation of industry, or the growth of new centres of production. Among these causes in the United States it is obvious from the course of the curve showing prices in diagram III. that one of great importance is the fact that the conditions are favourable to continued cheapening in the production of coal. The mines are still comparatively shallow. In many cases they can be worked for long distances by level adits (as is the case with a few of our South Wales mines). It is not necessary to work any but the thicker seams, such as facilitate the use of machinery (see below, par. 42). The condensation of the population from various causes in the neighbourhood of the coal mines likewise greatly promotes cheapness of working, as providing both labour and a local market.

17. But the influence of causes tending to the decentralisation of industry cannot perhaps be more clearly illustrated than in connection with the most typical of all British manufacturing industries, that of cotton. I call it typical because it is one in which, after the era of the great inventions, we rapidly acquired and have since retained an unquestioned predominance, in spite of the fact that we are wholly dependent on imported raw material—a predominance that was never approached in the woollen industry, even when we had almost a monopoly of one of the most prized varieties of the raw material. We do so partly in

COAL CONSUMPTION PER HEAD SINCE 1883

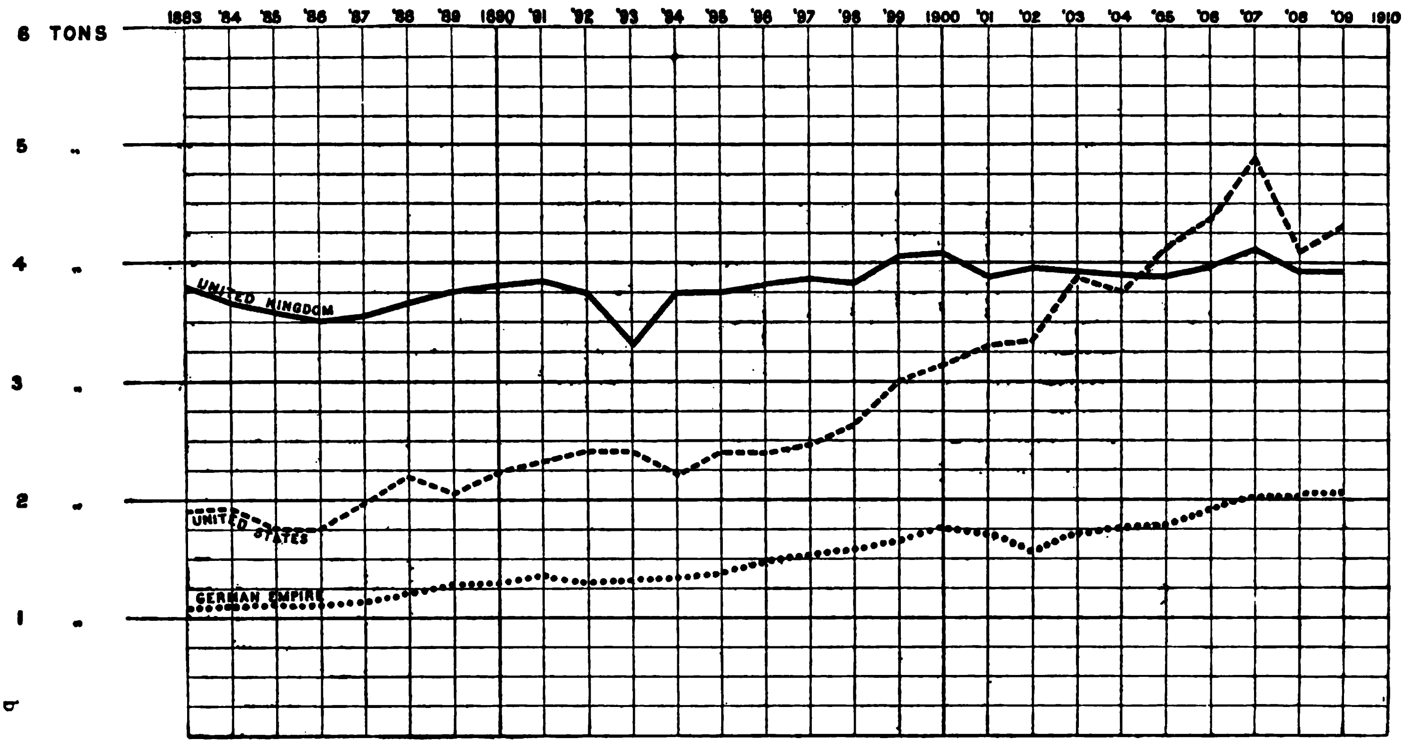


DIAGRAM II.

PRICE OF COAL PER TON SINCE 1883

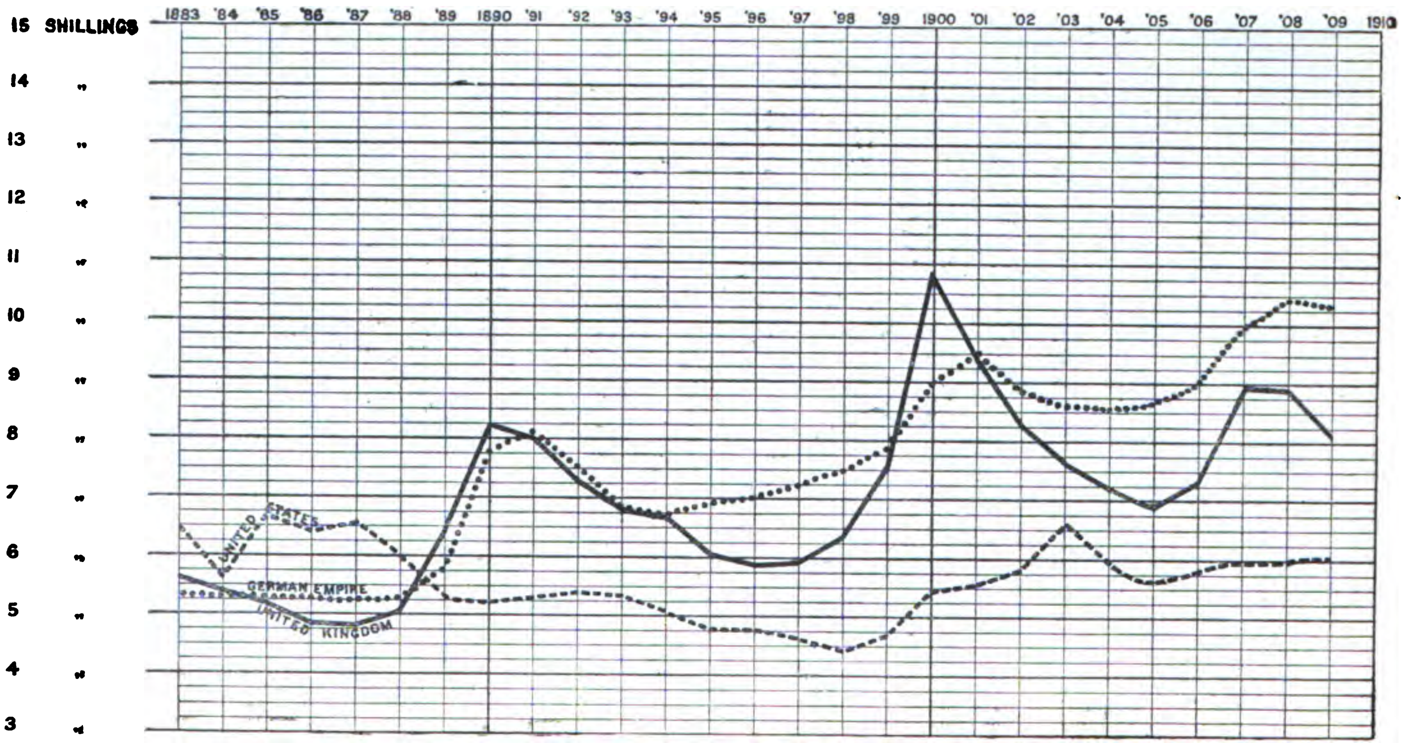


DIAGRAM III.

consequence of the special natural advantages which we enjoy for the industry, as stated in par. **507**; partly in consequence of the general causes favouring concentration of an industry that is carried on on a very large scale; but still more perhaps in consequence of the fact that this is an industry that in a peculiar degree enables us to turn our great commercial advantage to account (see above, par. 8). No class of goods has a wider market than cottons. They are consumed in all parts of the

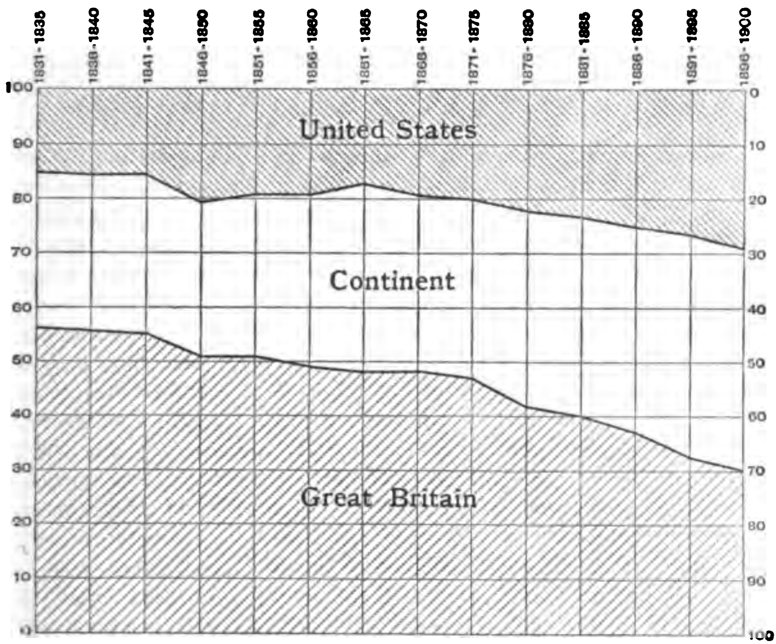


DIAGRAM IV.—Percentage of Cotton-consumption in Europe and the United States in quinquennial periods from 1831-35 to 1896-1900. The interval between two adjacent horizontal lines represents a consumption in the countries named of 10 per cent. of the total supply.

world.[1] From any one centre of production most of the markets must be reached from the seaboard, and for such markets no country has on

[1] In illustration of the wide-spread distribution of the British cotton markets, it may be mentioned that in the year 1902, when the total value of the cotton tissues exported from this country was somewhat more than 55,000,000*l*., although India and China were by far the most important markets there were no fewer than fourteen countries or parts of the world (India, China, Turkey, Egypt, Australia, the United States, the Dutch East Indies, Brazil, Japan, British South Africa, the Argentine Republic, Germany, the Straits Settlements, and British West Africa) which each took British cotton tissues to the value of more than 1,000,000*l*., and nine (Belgium, Canada, Holland, Chile, Morocco, Foreign West Indies, British West Indies including Guiana, Foreign West Africa, and Greece) which each took such goods to the value of between 500,000*l*. and 1,000,000*l*. The countries are mentioned in the order of importance as markets.

the whole advantages equal to our own. All will admit that in turning these advantages to account in the cotton industry we have been enormously assisted by our free-trade policy. In consequence of all these advantages the industry has grown almost continuously, except during the period of the American Civil War, as is shown by the following figures:—

Millions of Pounds of Raw Cotton consumed in the United Kingdom in each of the Quinquennial Periods of the Second Half of the Last Century

Period . .	1851–55	1856–60	1861–65	1866–70	1871–75
Mil. lbs. .	750	947	629	974	1,229
Period . .	1876–80	1881–85	1886–90	1891–95	1896–1900
Mil. lbs. .	1,255	1,444	1,541	1,579	1,687

Nevertheless, in this industry the relative position of this country has been declining continuously, though at an unequal rate, for a long period. This is conveniently shown in the table given on p. 100 of Ellison's *Cotton Trade of Great Britain*, on which, together with the data given in the same author's *Annual Review of the Cotton Trade*,[1] diagram IV. on the preceding page is based.

18. The diagram shows that foreign competition is not merely a matter of recent years. The outcry on this head seems, indeed, to be peculiarly loud at present. This is possibly because foreign competitors were at first engaged in the easier task of conquering the home market, and have only recently begun to compete more keenly in neutral markets. It will be noticed that the diagram showing the consumption of cotton does not include all parts of the world that now work up cotton by machinery on a large scale. It does so for the earlier decades embraced by it. Before the middle of last century Canada was not worth considering as a consumer of raw cotton. Now it is. In 1868 it imported less than one million, in 1898 upwards of seventy millions of pounds of raw cotton for home consumption. India and Japan have also since entered the field as competitors in the machine cotton industry, and if their consumption of raw cotton were to be taken into account, the relative decline of the British industry would be seen to be still greater. The diagram, moreover, does not distinguish between the older and the newer seats of the cotton industry in the United States; but with reference to the point now under consideration, the growth of cotton spinning in the southern states of the Union, as well as in India and Japan, is peculiarly instructive. Figures are therefore here given in continuation of those in par. **259*a*.** In the southern states the number of cotton spindles increased from 1·2 to 4·8 millions between 1887 and 1900; in India from 2·9 to 4·9 millions between 1890 and 1901; in Japan from 325,000 in 1892 to about 1,000,000 in 1897—but Japan is now in the exporting stage for yarn and the industry seems to be no longer progressive: the

[1] Kindly supplied to me by the compiler.

number of spindles there was little greater in 1900. In the case of the cotton industry of India and the United States the question of tariff hardly affects the matter. In India cotton yarns are admitted free, yet, in spite of dear coal, cotton spinning by machinery has been steadily growing there for more than half a century. The first mill was started in 1851. The geographical advantages of local supplies of raw material, abundant labour, and a local market have been decisive. Japan has a five per cent. duty on imported yarns, and has, besides the local market, the advantage of local supplies of coal to counterbalance the necessity of importing the great bulk of its raw material. It is noteworthy, however, that in the export trade it competes with difficulty with India even in the Chinese market. In the United States the southern industry competes chiefly with that of the north, against which it enjoys no protection. Again the preponderating advantages are geographical. The growth of the industry, particularly in India and Japan, has greatly affected the industry of Lancashire, which has been compelled to turn its attention more and more exclusively to the higher (finer) counts of yarn, and the production of a greater proportion of woven goods for the Eastern markets—that is, goods in which the advantages of a more highly organised industry producing for a wider market can still tell. A similar change has been brought about in the northern seats of the American industry by the development of the southern. But in neither case does the change stop there. Both India and the southern states of the Union are beginning to manufacture the finer yarns in greater and greater quantity. In 1900–01 more than 20 per cent. of the weight of yarns produced in India was of counts above 20s. That, it is true, was a year in which the production of the lower counts was abnormally low; but the actual amount of the finer yarns spun in that year was in excess of that of the previous year, when the proportion was little more than 12 per cent. of the whole. A steadily increasing quantity of woven goods is now also being produced by mills in India. In the Southern States of America, also, a steadily increasing proportion of spindles is being devoted to the higher counts.

19. In the iron and steel industries the development of local advantages in other countries has had a still greater effect on the relative position of the corresponding industries of the United Kingdom in the production of the world. Here, again, it is useful to illustrate some of the more important relevant facts by means of a diagram (V.). The diagram shows first that the United Kingdom has completely lost its supremacy in the production of iron, and it suggests one geographical circumstance that may contribute to account for that. It is no longer able to keep pace within its own borders with the growing demands for iron ore, but is becoming more and more dependent on imports from abroad. On the other hand, our two

great rivals are better furnished. The diagram shows that their production of iron ore still keeps pace with that of pig iron, and four maps have been prepared,[1] showing the position of the coal and iron ore deposits of the United Kingdom, Central Europe, and portions of North America, with the view of throwing further light on the geographical situation from this point of view. These maps give a rough indication of the relative importance of the iron ore deposits as regards production. These indications are, however, based on values,[2]

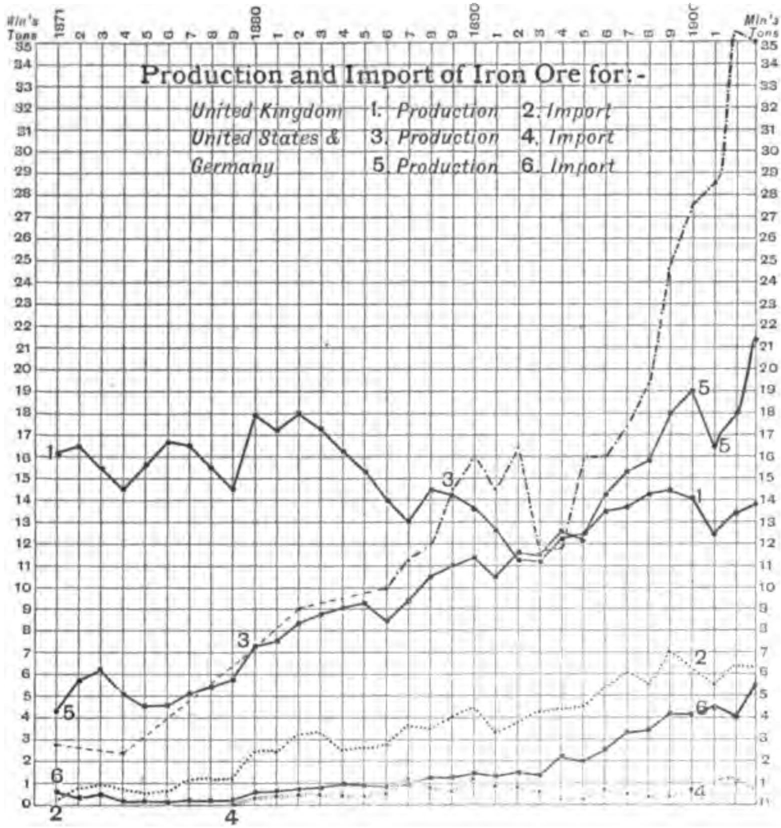


DIAGRAM V.

not quantities, seeing that a ton of iron ore means in different cases such very different things, in consequence of differences in richness and freedom from noxious impurities. But the maps do not indicate all the advantages of situation. In Germany the iron industry has been greatly stimulated by the improvement in the Rhine navigation

[1] Pp. 225, 281, 465, 486.

[2] They are all based on values in a particular year, but nevertheless represent roughly the relative importance of different iron ore fields for a long series of years.

made towards the close of the nineteenth century (577*a*). In the United States it will be noticed in the map including the northern parts that the area of greatest production is far from any coalfields; but this is compensated by the mode in which the deposits occur. They lie in enormous quantities, capable of being quarried with exceptional ease (897*a*), and of being handled and transported both by water and rail at an exceedingly low cost. On the lakes the ore is carried in steel 'whalebacks,' one of which provided with a propeller drags two consorts not so provided, and thus having all the more accommodation for cargo, so that a single steamer may carry or haul about 10,000 tons of ore on vessels capable of passing through the Sault Ste. Marie canals, and, arrived at the port, six or seven trains of 50-ton steel railway wagons might carry all that cargo to a great iron and steel working centre like Pittsburg; whence return cargoes of coal can always be obtained in consequence of the abundance of coal at that centre and its deficiency in the region round the lakes.

20. But, further, we have to consider the market. In this case the development of the industry was greatly assisted in the countries of both our rivals (as well as many others) by protective tariffs securing so far as possible the home market. With regard to that point all that the geographer has to note is the extent and importance of the market so secured, and it is a vital consideration that within its own borders the United States offers the largest (the wealthiest, though not the most populous) free-trade market in the world for the products of this as of most other industries, and that Germany (that is, the German Customs Union) is one of the largest on the mainland of Europe. But apart from that it is important to remember that the great markets for iron and steel products are the most advanced industrial countries generally—for the most part so situated that they can be reached from inland centres of production in Europe and North America without break of bulk.

21. These industries demand the highest organising capacity and great supplies of skilled labour of all kinds, and hence are of such a nature as to be much more difficult to establish in small local markets than the textile industries. This is particularly true of some of the more complicated branches of the iron industry. And hence in the more advanced industrial countries we find a rapid expansion of the machine industries compensating in some measure a less rapid advance of those connected with textiles. This is illustrated by the still continued increase in the relative importance of the British exports of machinery as shown in the last export tables added to the appendix. Yet under this head also we can see the operation of decentralising tendencies. Though our rivals are fewer in number in this than in the textile industries, still for many years past the exports of machinery from the United States and Germany have been growing more rapidly than our own. In this industry, moreover, as skill and

organisation count for very much more in the value of the finished product than the cost of the raw materials, centres by no means favourably situated with regard to these may sometimes compete successfully with others better situated in this respect, even in the remotest markets, provided only they are situated where the local market warrants their being conducted on a vast scale.

22. In some of the chemical industries this is true in an even greater degree. In these education is often the decisive factor in competition. Whole troops of chemists are required to keep a particular factory in the forefront, and the advance of Germany under this head, already notable at the date of the first edition, seems still to be going on largely in consequence of the more general diffusion of advanced scientific and technical education.[1] Nevertheless under this head also some geographical factors have to be borne in mind. The value of the Stassfurt deposits is referred to in the body of the book (582). For other chemical industries it is of great importance that the extensive potato culture of the country affords the raw material for the manufacture of cheap alcohol. This, it may be mentioned, can be used in industry in a pure state free of duty, which was not allowed in the United Kingdom before 1902.

23. If now we may venture to form any forecast with regard to the immediate future of British industries and commerce we may again derive some assistance from the general considerations already brought forward. As regards ocean transport and all that enhances the advantage of ocean transport there is every prospect that improvements in the same direction as those already indicated will still go on. The importance of this advantage is being more and more felt through the growing keenness of competition. The movement to the seaboard referred to in par. 513*b* is not confined to the iron industries, but has been exemplified also in other industries working largely for export.

24. Much attention has also been given to the problem of improving the internal means of transport, but in some of the proposals with a view to such improvement, or the mode of advocating them, there has been too frequently a failure to recognise the true nature of the geographical conditions affecting the question. Much has been said for many years on the advantage of large railway wagons, and the enormous economy of transport that the Americans are enabled to effect by this and other means. It is often, however, apparently forgotten that such economies can be (and are even in America) effected only under certain conditions. Where, for example, wheat is grown in enormous quantities in comparatively small areas in Manitoba or Minnesota, and the bulk of it has to be transported to one or two great markets, the problem is entirely different from that of collecting wheat in forty or

[1] See on this head *Consular Reports, Miscellaneous Series*, Nos. 561. 578.

fifty counties and redistributing it in ten thousand towns and villages.[1] Local railway rates in England do not compare unfavourably with those in America.[2] An American writer on transportation maintains that 'American railroads make local freights pay for the trouble of handling grain at a low profit.'[3] In certain cases no doubt the adoption of larger railway trucks must be an advantage. Several English railway companies have already made experiments with 20- to 40- ton trucks, but not in every case with the good results hoped for. In other cases it is to be regretted that the original construction of the line (as to dimensions of tunnels, turntables, &c.) does not admit of the experiment being made without excessive expenditure.

25. Several English railway companies have framed special rates with the view of encouraging trade in local agricultural products. In this the Great Eastern Railway appears to have been the pioneer. The different schemes have different objects in view, according to the nature of the produce of the region for which they are drawn up. One of the most important schemes of the railway just named is one for the conveyance of small parcels of dairy produce, poultry, eggs, and the like at reduced rates. Provided these articles are packed in boxes so constructed as to favour economical packing in the carriages, they are conveyed from any station on the system to London and delivered there within a moderate radius at a cost of 4*d.* for 20 lbs. of goods.

26. In 1896 an act was passed in this country authorising and regulating the construction of light railways, which, it was hoped, would, among other advantages, have that of assisting the economical transport of agricultural and garden produce. So far that act has not had all the effects hoped for, and unfortunately those concerned

[1] It is said that the idea of reducing transport expenses by the adoption of larger wagons originated in the grain-growing regions of the North-west of the United States. (See *The Times*, June 1, 1903.) A railway official who was good enough to discuss this matter with me stated that the system with which he was connected had between 500 and 600 goods stations, and that to nearly every one of these a truck was sent every night, but in many cases those trucks carried only from half a ton to two tons. The advantage of constructing 50-ton 'cars' for such loads is not obvious. The difference between English and American railway management in respect of train-loads and size of wagons appears to arise principally from two causes. One is that referred to in the text, the marked distinction between the manufacturing and agricultural regions of the country. This causes the manufacturing regions of the United States to bear the same relation to the agricultural regions as England bears to the world at large, and as this relation in the case of England has given rise to big ships, so in the United States it has given rise to heavy train-loads. The other cause is a difference in time requirements in the two countries, and that again is largely the result of differences in available space. In America goods are often detained for a considerable time at certain stations till large train-loads can be made up for particular destinations. This involves extensive accommodation at all stations at which the traffic is large, and for that there is in our overcrowded country no room. In other words the cost would be prohibitive.

[2] See letters in *The Times* of June 16, July 24, and July 29, 1902.

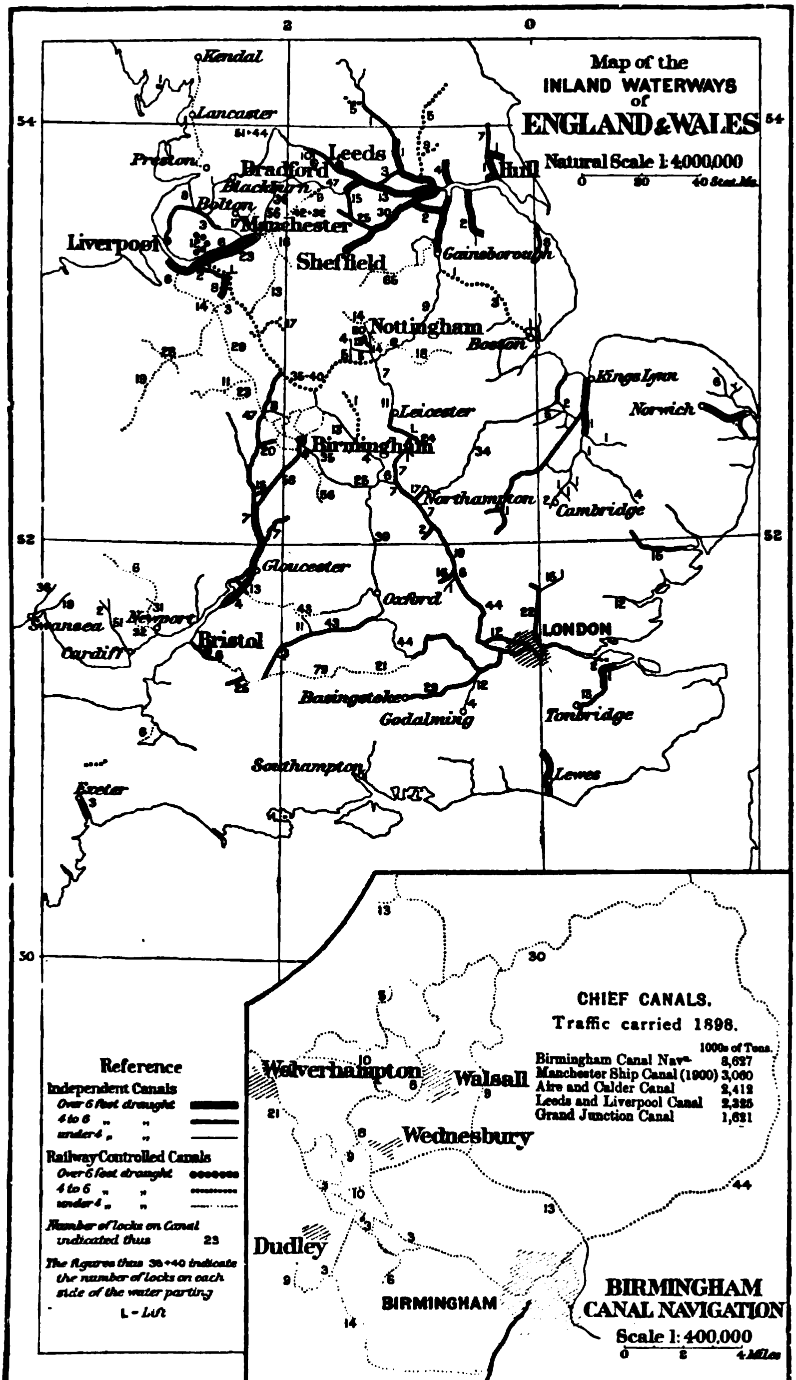
[3] Emory R. Johnson, *Inland Waterways: their Relation to Transportation*, p. 66.

with the planning of light railways do not all seem able to learn from the experience that might be derived from the history of railway development, and look ahead to the probable ultimate outcome of this movement. If light railways are really destined to prove an important auxiliary in transport, it seems certain that they are ultimately destined to link on to one another throughout large areas of the country. It will therefore be very regrettable if extensive systems are constructed without this being kept in view and uniformity of gauge so far as possible provided for. The light railways at present constructed serve, like tramways, more for passenger traffic than the carriage of produce.

27. In tramway construction the most important development of recent years has consisted in the application of electricity as the motive power. In this, as in other applications of electricity, it is admitted that this country is now far behind other leading industrial countries, but English engineers contend that this is mainly, if not entirely, due to adverse English legislation. It is contended that down to 1882 England was in the van under this head, but an act passed in that year authorising local authorities to purchase any electrical installation at the end of twenty-one years without making any allowance for goodwill had such a deterrent influence on investors that other countries shot ahead. The term was extended in 1888 to forty-two years, but the powers which local authorities have over the use of the streets enable them in many cases still to block the way of private enterprise.

28. In connection with passenger traffic the most striking development of recent years has been the introduction of the so-called mono-rail, in which the locomotive and carriages are placed astride of a single elevated rail, though they are at the same time steadied by two small side-rails. A railway on this system has existed for some years between Listowel and Ballybunnion in the south-west of Ireland, but the great advantages expected from its adoption are in connection with the traffic between great centres of population. In such cases it is asserted that a speed of 100 miles an hour or more by this system can be economically attained. In 1901 an act was obtained for the construction of such a railway between Manchester and Liverpool. Projects are entertained for railways on the same principle between Edinburgh and Glasgow, and London and Brighton.

29. The improvement of internal transport by means of waterways is another matter which in recent years has greatly occupied the minds of those interested in commerce both at home and abroad. For this reason three maps have been prepared, showing the inland waterways of England, France and Belgium, and Germany respectively, in such a manner as, it is hoped, will admit of useful comparisons. It is of the utmost importance that misconceptions should be avoided in the discussion of the means of transport, and since the date of the first



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edition of this work two blue-books have appeared[1] giving numerous particulars with regard to our own canals, and showing that at that date (1889) exaggerated and erroneous statements were current as to the causes affecting our canal traffic, and the publication of these reports has not yet put an end to the currency of such statements. In 1889 it appeared to be a generally admitted fact that we had been to a large extent deprived of the advantage of our canal system through the fact that most of them had come under the control of railways, which had deliberately discouraged traffic on the canals so acquired. The blue-books showed the first of these statements to be greatly exaggerated. In the case of England and Wales the figures in 1888 and 1898 were as follows:—

	1888	1898
Railway-controlled waterways	1,024	959
Independent waterways	2,026	2,208

Our map of the English waterways, based on these reports, shows that some of the independent lines are on some of the most important routes in the kingdom—two, for example, between south Lancashire and Yorkshire, two from the midlands to London. Of the two independent waterways crossing the Pennine Chain, the northern, the Aire and Calder Canal, paid in 1888 a dividend of 2·92 per cent., in 1898 one of 3·2 per cent. on the ordinary stock; the southern, the Rochdale Canal, paid in 1888 4·7 per cent., in 1898 1 per cent.; of those leading from the midlands to London, the most important, the Grand Junction, paid both in 1888 and 1898 4 per cent.; not extravagant dividends, in any case not such as to attract capital for the re-acquisition of canals by private companies from railways. Yet an important experiment of this nature was actually made between 1888 and 1898. On March 1, 1895, the River Dun Navigation, the Dearne and Dove Canal, the Sheffield Canal, and the Stainforth and Keadby Canal, jointly connecting Sheffield, Rotherham, and Barnsley with the Humber through the Ouse and the Trent, and having an aggregate length of 59½ miles, were transferred from the Manchester Sheffield and Lincolnshire (now the Great Central) Railway to a private company. In 1898 that company paid only ¼ per cent. on its ordinary stock, though it paid 4½ per cent. on the preference stock, which formed nearly 60 per cent. of the capital.[2]

80. With regard to the allegation that railways deliberately strangle the traffic of canals of which they have acquired the control, it is difficult to see the motive for this. If there is really an economy in using their own waterways, why should they not use them? In fact, the

[1] *Returns to the Board of Trade in respect of Canals and Navigations*, [C—6083] 1890, and [Cd.—19] 1899. See also par 58*a*.

[2] In 1900 and 1901 no dividend was paid on the ordinary stock. The total amount of traffic carried by the canal in 1888 was 927,254 tons; in 1898, 982,730 tons; but in 1900 it had sunk to 894,597. and in 1901 to 858,150 tons.

canals that carry the greatest amount of traffic in the United Kingdom—the Birmingham Canals—are practically under railway control, though they keep separate accounts and form a separate company. Both in 1888 and 1898 they paid 4 per cent. on the ordinary stock under the guarantee of the London and North-Western Railway Company.[1]

31. The somewhat delusive expectations of economy in transport from the use of inland water carriage are all based on the admittedly low cost of mere haulage at a slow rate. It is estimated that on an ordinary good wagon road a single horse-power will drag about 3,000 lbs. at the rate of 3 feet per second; on a railway about 30,000 lbs. at the same rate; in water up to as much as 200,000 lbs. But in making inferences from this general fact it should be borne in mind (1) that the cost of increasing the rate of speed is much greater by water than by land; (2) that the average rate of transport on canals is greatly reduced by the delays at locks; (3) that the economy of water transport is greatly reduced by the fact that waterways do not afford the same facilities as railways for conveying goods over the face of the country without break of bulk; and (4) that the waterways are in many cases of too small dimensions.

32. With regard to the first of these points it is noteworthy that some of the earliest experiments with steamboats were made with the view of increasing the speed and economy of transport on canals. Since the screw propeller was introduced, these experiments have been renewed with greater success, seeing that its use is not so likely to injure the canal banks. Inasmuch, however, as a great part of the difficulty of developing higher rates of speed in water transport arises from the fact that so much of the power of the propeller is lost in its passing through the water, it is somewhat surprising that so few attempts have been made to increase the speed by the use of locomotives on the canal banks. Experiments in this direction are indeed old. This mode of traction was tried on the Forth and Clyde Canal in 1839, steam locomotives being used. More recently electric motors running on rails on the banks have been employed both in France (on the Burgundy Canal) and Belgium (on the Charleroi Canal); and experiments of the same nature are said to be contemplated on the Lee navigation in England.

33. In view of the importance of the second consideration above mentioned, the map of the English waterways has been drawn up so as to show the number of locks. The delays due to this cause have given rise to various projects for economising time in surmounting differences of level in inland navigations. Hydraulic and pneumatic lifts are employed. Since 1875, an hydraulic lift, with a lifting power

[1] No doubt it is true that these and other railway-controlled canals prevent the fixing of low competition through rates by water from the important centres of south Lancashire to London.

of 100 tons, working through a height of 50 feet, has connected the Weaver navigation at Anderton, in Cheshire, with the Trent and Mersey Canal. One of more complicated structure, with a capacity of nearly 600 tons and a somewhat higher range of working, was completed in 1899 on the Dortmund-Ems Canal at Henrichenburg not far from Dortmund. Inclined planes have been employed from a very remote date in China. Recently the Grand Junction Canal has substituted inclined planes for the flight of ten locks which formerly overcame a height of 75 feet at Foxton in Leicestershire. The boats ascend and descend inclined planes simultaneously in wet docks which move up and down on rails, a stationary steam-engine effecting the lift. By this means two boats are moved up and down simultaneously in 12 minutes, while formerly one hour and 20 minutes was required for passing a couple of boats in either direction.

84. The difficulty of intercommunication by inland waterways without break of bulk arises from the fact that it is not practicable to construct canals in as many directions as railways, and the full advantage of such intercommunication, even where it is possible, can in many cases not be enjoyed, owing to the inevitable differences in canal dimensions. The larger the waterway the greater is the economy in the transport, but the construction of large canals is in many cases quite impracticable, in many others not economically practicable. Such differences have also militated against the working of different canal systems in co-operation with one another. Recently the Grand Junction Canal has indeed made arrangements with other canal companies which allow of its quoting through rates to Birmingham and the Derbyshire coalfields along the routes indicated on our canal map; but, unfortunately, this has not led to any increase of traffic.[1] Possibly that is in a large measure due to the fact that for the through traffic they are compelled to use boats of small dimensions—33 tons. It is for such boats that the Foxton lift has been constructed. Better results are not unlikely to follow from the working of this lift.

85. The differences in the dimensions are indicated on our small map only very imperfectly; still from this point of view the map may be usefully compared with those of France and Germany (pp. 257, 280). On the whole, it seems little likely that any great economy can be effected in water transport in England except by means of improved methods of traction and improved lifting apparatus.

86. If we consider now the resources for industry within the country we may note, with respect to those which are of most consequence as ancillary to manufacturing industry, coal and iron ore, new deposits of both are still being opened up, and those already known being made more available by improved methods of working. An important new coal-mining district is now being opened up by several railway companies in South Yorkshire, and coal-mining

[1] So the company was good enough to inform me.

machinery is gradually coming into use. New discoveries of valuable hematite ores have been made in Cumberland, and by the working of different new processes the extensive Cleveland deposits of inferior ore are being made available for the manufacture of better steel than that made by the ordinary basic process.

37. Such developments are likely to contribute to the further expansion of the foreign as well as the home market. Improvements tending to the benefit of native agriculture, on the other hand, are likely to promote only the home trade. Among these we may include refrigeration and cold storage, which are applicable to home as well as foreign products. Scientific dairying and agricultural co-operation in connection therewith have likewise proved extremely beneficial, especially in Ireland.[1]

38. Technical and commercial education are receiving increased attention. Among the most important movements in this direction in recent years have been the establishment of a faculty of economics and political science in the reorganised University of London, and one of commerce in the new University of Birmingham. Movements in the same direction are in progress in other universities. As to the results of these movements it is of course possible to be over-sanguine. A belief in the value of education is only slowly diffused in a community, and without that faith the value of the best apparatus cannot be fully attained. Moreover, it is well to remember that the highest education cannot nullify the geographical advantages of other countries, when these are turned to account with knowledge and intelligence. The best it can do, from an economic point of view, is to assist in preventing a country from losing industry and commerce for which it really enjoys natural advantages.

39. Turning our attention now to other countries with the view of estimating the probable effect of changes abroad on our own commercial and industrial development, we may divide such anticipated changes into those which are likely to be favourable to us and those which are likely to be adverse. If we regard everything likely to enhance the value of ocean transport as favourable, then among the schemes of this nature now contemplated none perhaps would be likely to prove of greater benefit to British commerce than the execution of the projected Montreal, Ottawa, and Georgian Bay Canal (860), which would bring a highly important part of the interior of North America into easier communication with the sea than at present.

40. To make up for the diminishing returns of our own iron-ore fields and the possible decline in the amount of the Spanish supplies, Scandinavia holds out the promise of sending much greater supplies of this commodity in the near future.

[1] See par. 485*a*.

41. It may be confidently anticipated that in the near future developments will take place in South Africa, West Africa, Egypt, and China that must be more or less favourable to the expansion of British industry and commerce, at least in the first instance, possibly also in Mesopotamia. It can hardly be doubted that those in South Africa are likely to be the most important. It seems to be absolutely certain that the gold-mining industry of the Transvaal will develop with hitherto unparalleled rapidity. That the United Kingdom must share largely in the expansion of commerce thereby brought about may be taken for granted, but, on the other hand, it is not to be taken for granted that the share of British commerce in South Africa in the future will continue to be as great as it is at present. A large part of the expansion must be in the importation of machinery and other articles of metal, in which we are encountering a keener and keener competition from other countries. The reasons for anticipating a considerable development of commerce in Egypt and West Africa are given in the text (801, 833, 834), and also as to China (773). In the case of Mesopotamia the anticipation is based on the grounds already stated in the first edition and now repeated with modifications in par. 715, and on the increased prospect of the Baghdad railway being completed within the near future. By whomsoever that railway is constructed, it can hardly fail to benefit in some degree the great maritime powers.

42. Among the changes in other countries likely to affect British industry adversely it is scarcely possible to lay too much stress on the rapidly increasing advantages of America in respect of coal, iron ore, petroleum, and the utilisation of water power. The decreasing price of coal in America as compared with the much steadier price in the United Kingdom (as well as Germany) is a matter of profound significance. Labour difficulties may render it doubtful whether this downward tendency will go on,[1] but, on the other hand, it must be remembered that the use of machinery in coal mining is there in general easier than in the older seats of production, and is rapidly gaining ground.[2]

43. But the advantages of America in respect of the most useful minerals are not confined to the United States. The enormous blast furnaces and steel works that have been erected at Sydney, in Cape Breton Island, for the utilisation of local supplies of coal and limestone, and the iron ores quarried and handled with great cheapness on the

[1] This great cheapening of production has taken place only in the case of bituminous coal, and Mr. D. A. Thomas, M.P., doubts whether it can continue. See a paper on 'The Growth and Direction of our Foreign Trade in Coal during the last Half Century,' in *Journ. Roy. Stat. Soc.*, vol. lxvi. pp. 491–2. The diagram on p. xxxii seems to confirm Mr. Thomas's doubts.

[2] In 1891, 6·2 million tons (= 4·1 per cent.); in 1896, 16·4 m. tons (= 9·6 per cent.); in 1900, 52·8 m. tons (= 24·6 per cent.). In 1904 5·7 million tons, in 1905 8·1 m. tons, in 1906 10·2 m. tons (about 4 per cent.), and in 1908 13·6 m. tons (= 5·2 per cent.) of coal was cut by machinery in the United Kingdom.

islet known as Bell Island, in Conception Bay, Newfoundland, cannot but create a serious competition with the iron industry of the United Kingdom in many markets.

44. Many countries are much better provided with water power than our own, and it should be borne in mind that all the inventions by which this form of power is made more widely available must tend to diminish our relative advantages in manufacturing industry.

45. Reference is made in the body of the book (494) to the remarkable constancy in the aggregate value of our *entrepôt* trade. It is, however, greatly to be feared that the completion of any of the projects for establishing an economic trade-route across Central America would tend to inflict a serious blow on this branch of our trade by diverting a large part of it to the United States. The two great causes that tend to foster such a trade are: a more or less intermediate position between the great commercial countries of the world, and a large trade based on the independent resources of the country to which the *entrepôt* trade belongs. Now the United States has certainly this last requirement, and is sure to have it in a greater and greater degree in the future. Population and foreign trade seem almost certain to increase there and in Canada more rapidly than in the United Kingdom or any European country. The first of the two requirements above mentioned would be satisfied by the completion of any of the projects referred to. The southern parts of the United States would thereby be placed in an intermediate position between the populous countries of eastern Asia and the most populous countries of Europe. It is not, therefore, to be wondered at that the construction of the Panama Canal should have been resolved upon by the United States.

46. It should, however, be observed that by no possibility can the carrying out of any of these projects have such an important effect on the commerce of the world, and lead to such a rapid expansion of traffic, as was brought about by the opening of the Suez Canal. This canal greatly shortened all the voyages between the most important parts of the East and West, the West including the eastern seaboard of North America. In a minor but still important degree, it also shortened the distance from Australia to Europe. The table given on p. 623 [1] shows, on the other hand, that the Panama Canal will effect no shortening of distance between Europe and the East or Europe and Australia. It will not even make the distance from New York to Shanghai, that is, the Yangtse valley, shorter than that from Liverpool or London by the Suez Canal. It may also, I think, be taken as certain that the shortening of distance from New York to Shanghai by some six hundred miles will not suffice to divert all the

[1] The discrepancies in statements of ocean distances are such that I despair of finding agreement in different authorities. The distances given in the table here referred to are the results of measurements made by myself with a quadrant on an 18-inch globe.

traffic between these ports from the advantageous route by Suez. It is chiefly the western side of America that will be brought nearer to the Atlantic, and that side of America is, on the whole, far from productive in proportion to its length. By far the most productive parts of it are a few valleys in the United States. Elsewhere that seaboard is largely bordered by mountains rich at most in timber, by deserts, and by dense tropical jungle. It is true that even the deserts are not without commercial products, but the most important of these, nitrate of soda, at present finds its way to Europe chiefly in sailing ships, and it is very doubtful how much of that traffic could be diverted through a canal.[1]

47. Inasmuch as fiscal policy undoubtedly affects the commercial value of local resources and place relations, it cannot be said that the discussion of the suggested preferential tariffs between this country and the colonies would be altogether out of place in this work; but the omission of such a discussion will no doubt be excused in view of the vastness of the subject and of the fact that the relevant considerations are more economic than geographical. I have, however, compiled a table, from figures already for the most part to be found elsewhere in this work, in order to exhibit in a compact form data bearing upon this discussion or of interest in connection with it. Since the recent growth in our export trade to British possessions has been mainly due to the increase in the trade with Hong-kong (which is not really colonial trade at all, but trade with China and other Eastern countries) and South Africa, I have introduced lines in the table showing the variations in that trade apart from these possessions. The fifth line shows the total export trade with our nearest neighbours, and the last with a group of countries with the most highly protective tariffs.

United Kingdom—Exports of British and Irish Produce and Manufactures, exclusive of ships and their machinery. Percentages of total values in—

To	1843–45	1861–65	1866–70	1871–75	1876–80	1881–85	1886–90	1891–95	1896–1900
All British possessions . . .	31·08	32·54	26·97	26·48	33·49	35·00	34·36	33·10	34·40
All British possessions, except Hong-kong	28·70	31·51	25·63	25·48	31·89	33·58	33·31	32·20	33·50
All British possessions, except Hong-kong and South Africa .	27·80	30·21	24·75	23·86	29·32	31·25	30·57	28·40	28·40
All foreign countries . . .	68·90	67·46	73·03	73·16	66·51	65·00	65·64	66·90	65·60
France, Belgium, Holland, Germany, Sweden and Norway .	25·08	23·27	25·13	28·84	26·22	23·96	21·91	23·60	25·60
France, Germany, Italy, Russia, and United States . . .	31·78	32·61	35·83	37·57	32·82	31·68	30·92	30·70	29·50

[1] See the very careful and detailed estimates of possible traffic through an interoceanic canal in a paper by Colonel George Earl Church on 'Interoceanic Communication on the Western Continent' in the *Geog. Jour.* vol. xix. p. 313 (March 1902).

48. The issue of a new edition of this *Handbook* affords an opportunity which should not be let slip of inserting a few paragraphs partly to indicate developments in progress tending to alter geographical values, partly to draw attention to some of the facts contained in important new sources of information, and partly to add some notes which will be found of use in considering the statistics of imports and exports in the appendix, and which in some cases are much needed.

In our own country we may note first the modes in which our fuel resources are getting increased or having their value enhanced. Recent borings have extended the area of proved workable coal in the eastern midlands considerably beyond the limit indicated on the map on page 225. Mines have been sunk in the neighbourhood of Doncaster, and the middle of Nottinghamshire, and workable seams have even been found to exist at Scunthorpe in Lincolnshire, where, as the map shows, there are important deposits of iron ore. In the western midlands also coal is now worked beyond the limits shown on that map, a mine having been opened at Binley, just outside (south-east) of Coventry, in Worcestershire, this mine being the nearest to London of all as yet in operation—about ninety-five miles from Euston Station. The Kent and Sussex mines will be even nearer, and there appears to be a prospect of those yet being worked with commercial success. Coal is now mined in greater quantity than formerly at Scremerston, near Berwick, which is getting made a coal-port.

48*a*. A second Royal Commission on the Coal Supplies of the United Kingdom reported in 1905, and the total quantity of available coal was estimated by that Commission as follows:—

	Millions of Tons
Above 4,000 feet[1] below the surface in proved coalfields . .	100,915
,, ,, ,, in unproved coalfields . .	39,483
Below 4,000 feet in proved coalfields	5,239
	145,637
Under the sea off the coast of Cumberland, 5–12 miles beyond high-water mark	855
Under the sea St. Bride's Bay and Carmarthen Bay (anthracite)	383
	146,875

In the district in which the working of coal is now being most rapidly extended, the eastern limit of the area over which the estimate of the Commission extends runs from about the middle of the Humber south-eastwards, keeping west of Louth and reaching a point very near the south-west angle of the Wash. From there the limit runs nearly

[1] Human beings cannot stand prolonged dry heat of more than 120° F. or moist heat above 105° F. In the latitude of Edinburgh a temperature of 110° F. would be reached at a depth of about 3,750 feet, one of 120° at 4,350 feet.

due west to the southern end of the coalfield as at present ascertained. An estimate of Professor Kendall extends the limit far to the south-east over the south-west angle of the Wash.

48*b*. No less important than this extension of the coalfield of the eastern midlands of England appears to be that of the Belgian coalfield, first proved by borings in 1898, 1899, and 1901 (**557**); but subsequent borings seem to have shown that this coalfield forms an extension of the Westphalian coalfield of Germany, passing under Dutch Limburg, and extending westwards about the 51st parallel to near Antwerp, through a length of about 50 miles with a width of about 7 to 12 miles. The aggregate thickness of workable coal-seams (with a minimum of 16 inches in thickness) in this area varies from about 3 to 26 feet, and the total amount of coal in the field is estimated at 8,000 million tons. Abundance of good drinking water has been found underground in the same area.

48*c*. Various new uses are being found for peat, and as a fuel it is being more and more employed in gas engines, a use which is favoured by the fact that sulphate of ammonia is obtained in the process. As everything seems to betoken the likelihood of a greatly increased demand for nitrogenous manures in the near future, this circumstance seems likely to give a great additional value to all peat-bogs that are favourably situated.

49. The prospect of the production of beet-sugar in this country has never been so keenly discussed as it is at present. Experimentally sugar-beet has been cultivated on a small scale in various parts of England, and these experiments would seem to show that in favourable soils exceptionally large quantities of beet per acre are obtained, and that those beets have an exceptionally large sugar-content. Even in cold wet years the average yield of raw sugar has proved to be very promising. In recent years the average yield in Germany has varied from 13½ to 16 per cent., whereas in 1909, an exceptionally cold and wet year, English beets tested in laboratories yielded in some cases considerably more than 16 per cent. The success of these efforts would be important in several ways indirectly. As pointed out in par. **305**, the sugar-beet industry is advantageous to that of cattle-rearing. Further, it is an industry essentially attached to country districts as opposed to large towns. This is an almost inevitable consequence of the facts already mentioned. Where considerably more than 80 per cent. of the raw material is a waste-product so far as sugar-manufacture is concerned, and this waste as a bye-product finds its market in the same districts as that in which the raw material is grown, the advantage of having the sugar-factories close to the beet-fields is obvious. In Germany, according to the industrial census of June 1907, 83·6 per cent. of the people employed in sugar-factories lived in communes of less than 2,000 inhabitants. Now the factory industry is essentially a seasonal one, being carried on only for three or four

months during the winter—after the beets are reaped. It accordingly is one that will provide employment in country districts at a period when agricultural employment is slack, and will at the same time be an aid in maintaining the labour supply for those districts all the year round.

50. The statutory prohibition of the growing of tobacco in Ireland having been removed by the Finance Act of 1908, experiments have since been made in various parts of that country in the cultivation of this crop under the encouragement of the Department of Agriculture and Technical Instruction for Ireland.

51. A more general subject of experiment in agriculture is the influence of electricity in stimulating the growth of crops. The experiments that have been made so far seem to hold out the promise of greatly increased production by this means, and as the amount of electricity required for the purpose is small there is all the more prospect of success through the hope that wind-power will be available for the development of the electricity.

52. In so far as co-operation is a means of enabling those who take part in it to meet external competition and otherwise encourage local industry, the development of agricultural co-operative associations in Great Britain is also worthy of notice in the commercial geography of the country. Under this head Great Britain still lags behind some parts of the Continent, but there is now progress. Dairying societies such as have existed in Ireland since 1889 are now thriving in various parts of Great Britain, and farmers' associations of wider scope have been formed. Thus the Midland Farmers' Co-operative Association, formed in 1906, has now several hundreds of members in the counties of Nottingham, Derby, Leicester, and Lincoln. Its headquarters are at Nottingham, and through the general offices there the members buy machinery, fertilisers, seeds, feeding-stuffs, oil, coal, &c., and dispose of their products with the exception of live-stock. Thus a member sends samples of his grain to the office: officials keep themselves informed as to the best markets, and on the basis of the samples secure for the members the highest offer.

53. Looking abroad we may notice, as one of the most important developments in recent years in connection with the commercial geography of agricultural products, the foundation of the International Agricultural Institute at Rome in 1905, on the initiative of the King of Italy. Its aim is to collect, arrange, and publish as quickly as possible all kinds of statistics concerning agriculture, the condition and quantity of production in all parts of the world, the current price of such produce in the various markets, and other particulars, with the view of steadying the trade in such commodities and reducing as far as possible the speculative element in that trade. In 1907 the Institute was provided with a permanent seat in the gardens of the Villa Borghese at Rome, and monthly bulletins in Italian, English, and French began to be issued in January 1910.

54. We may also note as a special feature of recent years the efforts to develop the arid regions of the world by irrigation and dry farming. The extension of irrigation works is only a continuation of work that has been going on for many years, although in some parts of the world, as in the United States, Canada, and Australia, at an increasingly rapid rate owing to the rapidity with which land in the better watered parts of those new countries has been taken up.

54*a*. But irrigation after all is confined to very limited areas, and however productive it makes those areas it seems probable that a much greater aggregate increase of production is likely to result in the end from the extension of the practice of what is called dry farming. By this is meant the treating of the land in such a way as to conserve the moisture which it contains, the essential feature of that treatment being to prepare the surface in the form of a mulch. This term is applied to any covering of the surface that tends to resist the action of capillarity and protect the moist earth underneath against the direct rays of the sun. Even stones spread thickly over the ground may serve as a mulch, and hence it is that in the drier parts of the Mediterranean region stony tracts are regularly sown which in a moist, cool climate like that of the British Isles no one would think of cultivating. In gardening operations mulches are made with leaves, manure, straw, and similar materials, which, though very effective as mulches, have the drawback of preventing the continual stirring of the land and consequently the aëration of the ground underneath. But this continual stirring itself provides an excellent mulch in the form of a dry powdery surface soil, and it is by the frequent use of the plough, harrow, and other implements of tillage that dry farming is generally carried on. In loose light soils this treatment is supplemented by the use of an implement known as the sub-surface packer to consolidate the earth underneath the surface and so retard capillary action.

54*b*. The methods of dry farming have long been known and practised in the drier parts of southern Russia, and of late years have been more and more widely and eagerly followed in the arid regions of the United States and Canada. With a view to the encouragement of this method of farming a recent Act of Congress of the United States provided for the acquisition of homesteads of 320 acres in Montana, Oregon, or Washington, where the land is not mineralised, is not capable of irrigation, and contains no merchantable timber. But nowhere, it may be, do these methods seem to hold out the promise of a greater revolution in production than in South Africa. Abundant crops of wheat, and even maize, have been grown by these methods on the government experimental farm at Lichtenburg, in the west of the Transvaal, about 150 miles due west of Johannesburg, and within 40 miles of the Bechuanaland frontier. Seeing, however, that a great amount of labour and no little capital are obviously involved in dry farming, we must await the results of a wider experience before

we can look forward to the production of large amounts of such crops in that region in the near future.

55. In connection with agriculture attention should be drawn to the rapid progress being made in the fight against malaria. The discovery of the connection between malaria and certain mosquitoes goes far enough back to have been referred to in the fourth edition of this work (668a), but the methods of combating the disease deduced from that discovery are now so widely practised that it seems likely that in no long time there will be no remnant of truth in what is stated on this subject in par. 827. In Cuba and in Panama, the war against yellow fever has been waged with such success that that also is now spoken of by those who can speak with authority as a vanishing disease. More stubborn is the resistance offered by sleeping sickness, a disease which is known to have been endemic in Africa for hundreds of years. From time to time it appears to break out as a scourge, and in the last few years it has carried off thousands in Uganda, the Congo region, and other parts of Central Africa. The disease has been ascertained to be due to an internal parasite, *Trypanosoma gambiense*, transmitted chiefly by a species of tsetse fly, *Glossina palpalis*, which is confined to the immediate vicinity of expanses of water, and this knowledge has led to methods of protection which have had considerable success, though the disease is far from being vanquished.

56. In 1908 soya beans from Manchuria appeared for the first time in European markets, and attained importance with such rapidity that in 1909 440,000 tons passed through the Suez Canal, contributing not a little to the fact that in that year the tonnage of vessels that passed through the canal in ballast attained the previously unequalled figure of 671,000 tons. The beans have proved of great value as cattle food. Being very rich in oil they are also employed in soap making, the resulting bean-cake being given to cattle. So suddenly did this trade grow, that it caused no little hardship to the farmers of Japan and southern China, who depended on the bean-cake for manure, as well as to the Manchurian oil-pressers who manufactured and exported the cake. Other notable trade developments in agricultural products in quite recent years are the export of maize from South Africa, chiefly Natal, to Europe, which has attained large dimensions as rapidly as the trade in soya beans, and the export of Manchurian wheat to Europe through Vladivostok. Both products are said to be of exceptionally high quality. The flour from Manchurian wheat is stated to be peculiarly rich in gluten.

57. Under an act passed in 1908 an important change has been made in the management of the port of London. With a view to meet the increasing requirements of shipping, and the growing competition of home and foreign ports, the control of the port of London, including the whole of the tidal portion of the Thames from Teddington downwards, was handed over on March 31 to a body known as the Port of London Authority, empowered to raise revenue by tonnage dues on

shipping and dues on goods. The authority is to consist in future of twenty-five elected representatives of persons and bodies representing the trading interests of the port,[1] four members appointed by the London County Council, two by the Corporation of the City of London, two by the Board of Trade, one by the Admiralty, and one by Trinity House, in all thirty-five members. The schedule of maximum rates on goods has to be sanctioned by Parliament.

58. Since the appearance of the fourth edition of this work, a Royal Commission on the Canals and Inland Navigations of the United Kingdom has sat and reported. It was appointed in 1906, and issued its final report[2] at the end of 1909. In that report it recommended that a Central Waterways Board of three or five paid commissioners should be appointed, and that to that board should be handed over the administration of the present government canals, the Caledonian, and the Crinan in Scotland, and also four great trunk canals connecting the midlands with seaports, which, along with certain branches, they advise should be constructed by the state. Acting under instructions of the Royal Commission, Sir John Wolfe Barry and Partners have since reported on the cost of those works,[3] the nature of which will be to to some extent seen from the following particulars:—

Estimated Cost in Millions Sterling and Two Decimals of a Million of Constructing Inland Waterways

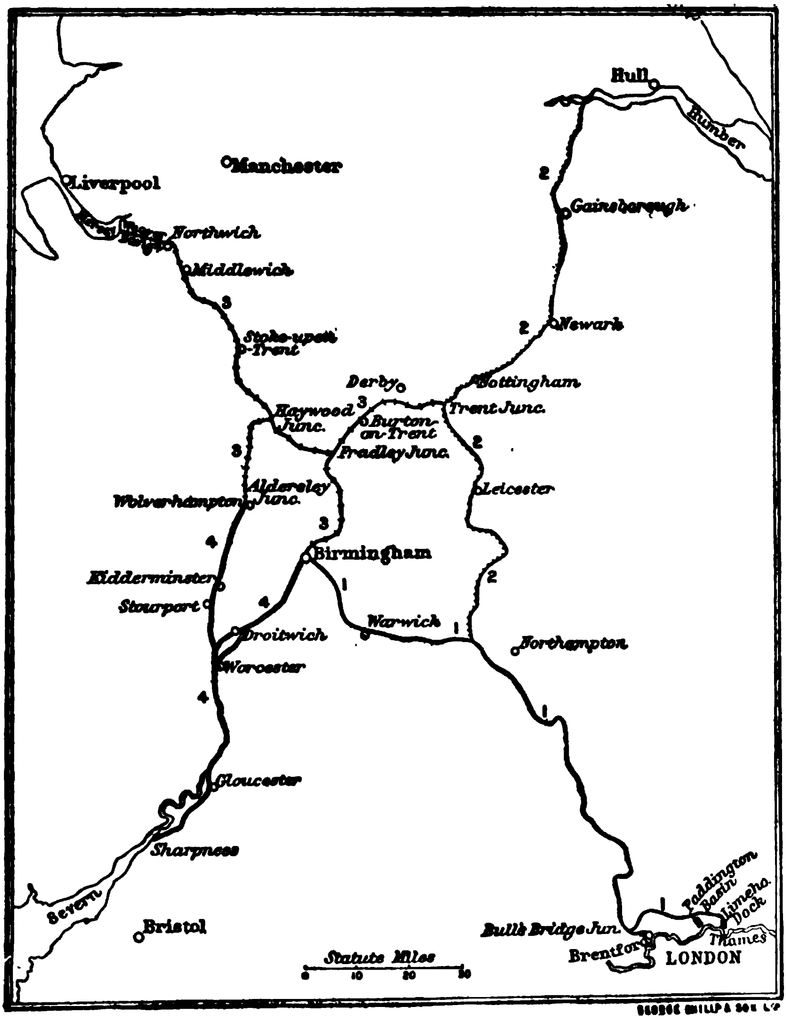
	For Barges of 100 Tons	For Barges of 300 tons
1. Brentford to Birmingham	£4·17	£7·44
Bull's Bridge Junc. on this canal to Paddington Basin and Limehouse Dock. .	1·11	2·51
	5·28	9·95
2. Norton Junction on to Leicester, Nottingham, and the Humber	2·23	3·76
3. Birmingham to the Potteries and the Mersey .	2·56	4·89
Fradley Junction to Trent Junction . .	0·67	1·26
Haywood Junction to Wolverhampton and Aldersley Junction	0·49	0·91
	3·72	7·06
4. Birmingham to the Severn (Sharpness) . .	1·34	2·56
Diglis Basin (Worcester) to Aldersley Junction	0·92	1·39
	2·26	3·95
Grand Total	13·49	24·72

The route from Birmingham to the Severn in the estimate given above passes to the south of Droitwich. A slightly longer, but easier, route passing through Droitwich is estimated to cost £8,000 less for the 100-ton and upwards of £13,000 less for the 300-ton barge.

The 100-ton waterways are generally designed to have a depth

[1] These in the first instance were nominated by the Board of Trade.
[2] [Cd. 4979.]
[3] Vol. ix. of the Report of the Royal Commission [Cd. 5083] of 1910.

THE FOUR TRUNK INLAND WATERWAYS PROPOSED BY THE ROYAL COMMISSION ON CANALS AND INLAND NAVIGATIONS.



of 7 feet, taking barges of 5 feet draught; but on the second trunk canal the estimate provides for barges of 120 tons from Nottingham downwards and locks on this portion of the waterway accommodating four such barges at once. On the third trunk canal the Weaver navigation, which already admits larger barges than the proposed waterway is designed for, is made use of in its last 9½ miles, from Northwich to the Mersey, and on the fourth waterway and its branch the estimate provides for the accommodation of 600 tons as high as Stourport.

The estimates are exclusive of parliamentary, legal, and engineering expenses, which last head apparently comprises water-supply, for where details are given the cost of this is also expressly excluded.

58*a*. The fourth volume of the Report of this Royal Commission[1] is another volume of Canal Returns, giving data for 1905, which are set forth along with the corresponding data of the returns for 1888 and 1898, cited on p. xlii, *n*. 1. As, however, various navigations not recognised in the previous returns are included in the new ones, the figures given for the total length of the waterways are not comparable with those of the earlier returns. As given in the new returns the figures are as follows (fractions disregarded):—

	Miles
Independent waterways	3,310
Waterways belonging to railways	1,145
Waterways controlled by railways	218

59. The increasing use of water-power for all the purposes mentioned in the last edition continues to be an important feature of economic development, and specially noteworthy is the use of large water powers, with the aid of electricity, for the fixation of atmospheric nitrogen and in the iron and steel industry. But it is not solely in connection with water-power that electricity in the iron industry is of geographical importance. Even where fuel is a more convenient means of developing electricity than water-power, electricity is coming more and more into use in this industry because it enables impurities to be got rid of which cannot be removed by the use of fuel. It is in consequence of this that the electric refining of steel is being more and more widely practised, with the result that a new value is given in some cases to inferior ores. Thus Middlesbrough ores by electrical refining may perhaps be used in making finer qualities of steel than at present, and the steelmakers there accordingly be made less dependent on Spanish and Swedish ores.

60. Among the new sources of information made available since the publication of the fourth edition of this work are the reports of the Department of Agriculture and Technical Instruction for Ireland. A report annually issued by that body gives information as to the trade of Ireland as distinct from the rest of the United Kingdom, and some of the data in those reports are reproduced in the statistical appendix on pp. 564 and 565. With regard to these figures, however, it should

[1] [Cd. 3719] of 1908.

be mentioned that we are informed that the Department has not at its disposal, in many cases, such satisfactory documents of information as those made use of in compiling the Annual Statements of the Trade of the United Kingdom, so that 'it cannot be too plainly stated that as furnishing an index of the external trade of Ireland the present system is inadequate,' but, on the other hand, it is contended, no doubt quite justly, that these returns furnish 'much information sufficiently approximate to be of great practical value.' It should be remembered that what is set forth in those figures is the whole external trade of Ireland, that is, the trade which Ireland carries on directly with foreign countries and the British colonies and dependencies, for which the department has at its disposal the information collected by the Customs officers of the United Kingdom, and the trade which Ireland carries on with Great Britain, made up partly of the import into Ireland of articles of British origin and export from Ireland of articles of Irish or other origin which are consumed in Great Britain, and partly of imports of foreign and colonial origin and exports to foreign countries and the colonies through Great Britain. This latter trade is very large in both directions, but there is in most cases no means of distinguishing it from the trade special to Great Britain and Ireland in their mutual relations. (See par. 529.)

60a. Still, bearing this in mind, one can in many cases infer from the nature of the commodities something as to their origin or destination or both. Thus, in the case of cattle and other live-stock, butter, and eggs, poultry, potatoes, and bacon and hams exported we are pretty safe in assuming that these are practically all of Irish origin and all find their final market in Great Britain; and it hence becomes interesting to have the means as we now have (at least approximately) of comparing the total Irish exports under these heads with the total imports of the same commodities into the United Kingdom. This does not give us an exact measure of the share which Ireland has in supplying Great Britain with those commodities, inasmuch as the respective imports include those into Ireland (whether direct or indirect), and in the case of bacon the import is very considerable. The Irish share in supplying Great Britain is thus understated in proportion to the amount of the Irish import relatively to the total import.[1]

[1] These things being kept in mind it is worth noting that in 1908 the value of the live-stock exported by Ireland was twice as large as the total import into the United Kingdom; that the value (though not the quantity) of Irish eggs exported was greater than that imported by the United Kingdom from any single country, Russia coming next; that the value of Irish butter exported was much less than half that imported into the United Kingdom from Denmark (about £4,000,000 against nearly £11,000,000, Russia, that is, chiefly Finland and Siberia, coming third with £3,400,000); that the value of the poultry exported from Ireland was much greater than that imported by the United Kingdom from any single country; that Irish exports of potatoes as compared with the imports into the United Kingdom from France and the Channel Islands rank second in point of quantity, but only third in point of value; and that in a similar comparison in respect of bacon and hams Ireland comes only fourth in value, being surpassed under this head by the United States, Denmark, and Canada.

60*b*. Looking at the imports into Ireland, we have no difficulty in identifying the imported coal as all of British origin, but in other cases we are wholly at a loss. Even the cotton manufactures imported into Ireland from Great Britain must include a considerable proportion of foreign origin.

60*c*. Making as careful an estimate as the existing information permitted, the department found the total value of imported goods re-exported from Ireland without change in 1908 was about £2·9 millions sterling, or about 5 per cent. of the total value of the exports. In every year the largest re-export is raw cotton shipped from Belfast,[1] a trade which throws interesting light on *entrepôt* trade generally. The raw cotton comes to Belfast from the southern states of the Union in ships laden with grain, timber, and timber products required in and round Belfast, and is afterwards despatched to Russia in ships that bring back flax.

60*d*. The important trade in butter was the subject of enquiry by a commission which was appointed in 1909 by the Department of Agriculture and Technical Instruction and reported in 1910.[2] The results of the inquiry made the influence of geographical circumstances on the trade in some cases very conspicuous. As might have been expected the bulk of the Irish butter sent to Great Britain is consumed on the west side of the island, whereas the principal markets of the Danish and other continental markets are on the east side. When one considers that London lies on the east side, and what that implies as to the numbers of the population for which the retail trade can be supplied directly from the river side without further break of bulk, one will see what an enormous advantage this must be; and when one thinks of the large additional population most easily accessible from the Humber, the Tyne, the Forth, &c., it will not seem surprising that Denmark and the Baltic should secure a large, even a predominant portion of this trade. Still, the Commissioners are of opinion that Ireland has advantages which it does not fully utilise. They think that Ireland has the best soil and climate in the world for all kinds of dairy produce, and find that in all the large centres of population in Great Britain the best of Irish creamery butter is considered to be the best butter in the world. But of this butter the quantity is very small, and the bulk of Irish creamery proprietors have not yet attained that degree of proficiency which might be looked for. Further, Ireland sends over large quantities of non-creamery butter, which is not the case with any other country supplying the wholesale markets of Great Britain, and though some of this butter is of the best, the bulk tends to bring down the average quality. In addition to that Danish butter reaches Great Britain in nearly equal quantities all the year round, whereas the Irish trade is almost confined to the six summer months, a fact which has in

[1] Value in 1908, £1,474,000. [2] Cd. 5092 of that year.

various ways a prejudicial effect on the Irish trade. For that reason the Commissioners strongly urge the practice of winter dairying in Ireland, even though that involves the necessity of the process known as pasteurisation, which, the Commissioners think, would not deprive Irish butter of its superiority of flavour, although it is admitted that that is one of the causes of the insipidity of Danish as compared with the best Irish butter consigned freshly from Ireland.

60*e*. Looked at as a whole the trade of Ireland presents two noteworthy features. First, unlike that of the United Kingdom, it shows a nearly even balance of imports and exports. Second, the value per head is exceptionally high. The report cited has a table comparing Irish trade in this respect with that of many other countries, and that table shows that even on the side of imports the value per head in Ireland is considerably higher than in the United Kingdom, on the export side much higher.[1] The only countries that show a higher value per head than Ireland are Holland, which for a reason to be mentioned later (par. 66*a*) does not count, Belgium, whose so-called special trade is in reality in large measure essentially transit trade, Switzerland and New Zealand. Ireland is thus an excellent illustration of the observation made on page 681 in the note to the last table in this book.

61. Another important official publication to which attention should be drawn is that entitled *Statistical Tables relating to British and Foreign Trade and Industry* (1854–1908),[2] issued by the Board of Trade, from which are extracted the data contained in the new tables in the Appendix on pp. 625–9. The tables of index-numbers on pp. 626–7 may serve to illustrate the observation in the preface to the first edition on the way in which statements of the gold values of exports and imports may fail to give a true indication of the nature of the trade. The table, however, requires some explanation. For the individual commodities the index-number merely expresses the ratio of the average value of a given quantity of each commodity in a given year to the value which it would have had at the average price of the year which is taken as the base. The general index-number is based on the average price of forty-five commodities, all 'articles largely consumed, such as wheat or wine or raw materials, but including such raw materials as bricks and hewn fir, but in working out the general index-number these forty-five commodities are not allowed to count equally, but are weighted or multiplied by different numbers in different cases, the weight allotted in the general Board of Trade index-number being the estimated value in millions sterling of the annual consumption of the article, generally during the period 1881–1890.

If then those forty-five commodities may be taken as illustrative

[1]

	Value per head, 1908 Imports	Value per head, 1908 Exports
Ireland	£12 16 9	£12 13 10
United Kingdom	11 10 6	8 9 4

[2] [Cd. 4954] of 1909.

of the total expenditure of the country in each year, the variations in the general index-number show the variations in the purchasing power of money in satisfying the wants of the community as a whole, in so far as those are expressed by the average expenditure of the community. That is, of course, not the same thing as saying that it indicates such variations for the great bulk of the people in the community, for such commodities as wine and caoutchouc count for little or nothing in the expenditure of the majority of the people. Hence, for instance, the rise in the index-number for caoutchouc tends to raise the index-number, say, of 1908 as compared with 1871 in relation to the expenditure of the poorer classes. Still, this consideration does not count for very much, as will be seen when it is mentioned that the weight for caoutchouc is only 1½, that for wine 5, while the two given for wheat (native and imported separately) amount to 47.

The general index-number having the meaning indicated, the variations in the index-numbers for the individual commodities when compared with the general index number serve to show how far special causes must have affected their fluctuations in value.

61a. Whatever be the cause of changes in index-numbers, the facts underlying those changes modify, and sometimes to an important degree, the significance of the values given for exports and imports. For example, if we take the periods of five years for which the average value of imports into the United Kingdom is given on pp. 558 and 600, and fill up the intervening gaps, we find that there is only one, 1886–90, which shows a decline in value as compared with the previous one—in round numbers £390 against £400 millions. But if we apply the Board of Trade index-number, base 1900, to these figures the values become changed to £333 millions in 1881–5 and £379 millions in 1886–90, showing an increase in the latter period of nearly 14 per cent. instead of a decrease of about 2½ per cent. Now with an index-number calculated as explained, this shows that during the latter period considerably more supplies of food and raw materials must have been coming into the country than in the one before. That being so, we may be sure that those increased supplies would find their way into the hands of consumers. Stocks are not kept on indefinitely in the hope of better prices. Perishable goods cannot be. So far as the increased imports, then, were of food-stuffs, they must have been a direct benefit to the consumers; so far as they were raw materials, increased supplies must have helped to maintain the demand for labour, for they were imported in order to be used, and manufacturers still found their advantage in using them in spite of the fact that they did not see their way to sell the products at former prices. It is not even a necessary consequence that the lower selling prices of the products meant lower profits to the manufacturers. 'The exports of a manufacturing country,' observed Sir Robert Giffen, 'may be nominally affected by a change in the value of the previously imported raw

material, although there is no real change in the native produce exported, or when the real change may be the opposite of the nominal one. Say that one-quarter of the exports consists of previously imported raw material, then a decline of 50 per cent. in the value of the raw material would produce a decline of 12½ per cent. in the aggregate export, which would be entirely nominal. If at such a time the exports were apparently stationary, the real fact would be that they had increased 12½ per cent., or rather about 17 per cent., allowing that the increase really takes place on three-fourths only of the nominal total.'[1]

61*b*. Other tables in the Appendix (p. 625) from the Blue Book last cited, making a comparison between the total special imports and exports of the United Kingdom, France, Germany, and the United States, and the imports and exports of manufactured goods of the same countries in recent quinquennial periods, are obviously suggestive of various subjects of inquiry which could not fail to present points of great geographical interest, but we cannot go beyond that in the way of brief comment.

62. The principal new tariffs which have come into operation since the fourth edition are the German tariff of December 25, 1902, which came into operation on March 1, 1906, the Payne tariff of 1909 in the United States, and the French tariff which came into operation on April 1, 1910. A new Japanese tariff is under discussion.

63. The statistics of imports and exports in the Appendix are in need of fuller explanatory notes than those given on p. 557. In various ways errors may be made in using such tables for comparison, and it is important to know the nature of the principal pitfalls in using them for that purpose. First, it is important to remember that such returns for the same country do not always refer to the same economic unit. When accessions of territory are gained by any country there is likely to be a change of this nature. Thus in the case of Chile statistics are given on p. 593 from 1874–75, but it is important to remember that the commerce of Chile was greatly increased by the cession of the provinces of Tarapacá and Tacna by Peru. On the other hand, no change was made in the economic unit to which Japanese statistics of commerce apply through the results of the recent wars with China and Russia. The commerce of the recent acquisitions is reckoned separately. The most important country with reference to which changes of this nature have to be kept in mind is Germany, the significance of whose statistics of external commerce was considerably modified by the inclusion of Hamburg and Bremen in the Customs Union in 1888. A further change was made on March 1, 1906, concurrently with the introduction of the new tariff. From that date German commercial statistics relate not to the Customs Union, but to that together with the free-ports, but this change has little effect on the special commerce of

[1] *Journ. of the Stat. Soc.*, vol. xlv. (1882), pp. 197–8.

the country, with respect to which the chief result of the change is that foreign goods imported into the free port of Hamburg for consumption or use within the limits of the free-port were, not formerly, but from the date mentioned, included in the special commerce of Germany, and goods produced in the free-port and introduced thence into the Customs Union were formerly included in that commerce, but now are not.

64. Statistics of external commerce usually include statements as to the description of the goods exported or imported, the quantities, the countries of origin or destination of the goods, and the value. In the case of many articles, and especially those most largely imported and exported, such as food-stuffs and raw materials, the description of the article presents no difficulty, so that one may deal with returns as to such commodities in making comparisons between period and period in the trade of the same country, or between different countries for the same or different periods without fear of being misled. But in many cases it is otherwise, and difficulties in making comparisons for the same country for long periods are constantly being made by tariff changes necessitating different classifications, and even where there are no tariff changes alterations in the classification of goods are often made simply with the view of giving a more satisfactory statement of the facts of commerce. However useful such changes may be from one point of view, it has always to be remembered that they have the drawback referred to. This drawback arises, it should be added, even when increased care is used, and hence increased accuracy arrived at in the collection of the original data.

65. With regard to the information under the head of countries of origin and destination a statement of the British practice is made on p. 602. An attempt to enter the country of real origin and ultimate destination is made by Austria-Hungary, Belgium, Bulgaria. France, Germany, Italy, Portugal, Roumania, Russia, and Switzerland; [1] but in the case of Belgium it is expressly stated that the information is imperfect, and in the absence of definite information the trade is referred to the frontier country through which the goods enter or leave. Bulgaria does not follow cereals beyond Braila. Italian exports through France or Switzerland are sometimes credited to those countries, and formerly this was frequently done also in the case of imports, but the raising of the tariff against French goods at the end of the eighties of last century caused greater care in the procuring of certificates of origin for goods derived from Belgium or the United Kingdom entering Italy through France.

65*a*. What is above stated as to the German practice was true in a measure even before the last tariff was brought into operation, but since

[1] In this paragraph and pars. 65*b* and 66*b* the authority mainly followed is a paper by Sir Alfred Bateman, and Mr. H. Fountain in the *Bulletin de l'Institut International de Statistique*, vol. xv., pt. 2 (London, 1906), pp. 219–39.

March 1, 1906, Germany has endeavoured to fix the countries of real origin and ultimate destination with greater precision than before. Previously to that date the country entered as that of origin was merely that in which the goods were bought, the destination that in which they were sold, but now the attempt is made to enter the country in which the goods were originally produced and that which they are intended ultimately to reach.

65*b*. Denmark, without explanation, gives the countries from which goods are imported and to which they are exported. In the general trade of the country Copenhagen is reckoned as a part of Denmark, but in the special trade it is treated as if it were a foreign country. Norway and Sweden make no attempt to ascertain the real origin or destination, and Holland refers goods to the country containing the port from or to which they are shipped, and in the case of goods entering or leaving by land or inland waterway to one or other of the frontier countries, that is, either Belgium or Germany. Spain tries to give both the country of origin and import, and the country of immediate and ultimate destination.

66. In some cases the practice with regard to values has been, and in one case still is, even more misleading than any of the practices that have prevailed as to origins and destinations. In England the earliest attempts at the systematic collection of commercial statistics appear to have been made in 1697. From that time down to 1797 inclusive the values entered for English commerce and, after the union of the Parliaments in 1707, for that of Great Britain, were official values based on the prices of 1694 and for new articles on the price of the first year of their introduction. The so-called values were, accordingly, not true values, but for each commodity served to give indications of changes in quantity from year to year, while the totals had little meaning at all. From 1798 in the case of exports computed values were added, not substituted, so that we have the absurdity in Porter's *Progress of the Nation* [1] of two tables giving professedly the same thing, the value to the last pound of exports from the United Kingdom from 1801 to 1849, yet utterly divergent from one another, showing from 1820 onwards a steadily growing excess of official over declared values till in 1849 we have

Official Value	£164,539,504
Declared Value.	63,596,025

In the case of imports computed values, that is, values officially estimated in accordance with what were believed to be the current prices of the time,[2] were introduced, and remained in use till 1870 inclusive, but from 1871 onwards declared values have been entered for imports also. This, observed Mr. (afterwards Sir Robert) Giffen,

[1] Second edition (1851), p. 356.

[2] For detailed information as to the methods of computation see a paper by Mr. Stephen Bourne in the *Jour. Statist. Soc.*, vol. xxxv. (1872), p. 206.

'should warn us all to use a great deal of caution in carrying our comparisons of import values farther back than 1870.'[1] It should be added that according to British practice import values are those at the port of arrival, that is, include freight but not merchant's profit, export values those at the port of shipment, 'free on board' (f.o.b.).

66a. My attention has only recently been called to the fact that in the commercial statistics of the Netherlands the use of official values such as were formerly employed in this country is still maintained. The figures on which the values of imports and exports of that country in the tables in the former editions of this work were based were taken, like those of other countries, from the *Statistical Abstracts for Foreign Countries*, where no warning is given as to their nature. It appears, however, that the 'values' in Dutch returns are based on the prices of 1860 or thereabouts. For that reason, in the present edition the tables that appeared on pp. 570 and 571 of the last edition, and on other pages of some of the earlier editions, have been deleted as worthless, and in place of the tables on p. 604 have been substituted others which will serve to indicate how great the divergence now is between the so-called values of the Dutch returns and the approximate actual values.[2] Considering what has been already said (par. 65*b*) as to the Dutch practice with respect to origins and destinations, and considering also the fact that the Dutch method of drawing up its statements of 'special commerce' affords little real indication as to the exports originating in and the imports consumed in Holland even if we pay regard to quantities only, one may feel pretty confident in asserting that Dutch commercial statistics are the least satisfactory of all those of important commercial countries.

66*b*. Declared values are adopted, as in the United Kingdom, both for exports and imports by Portugal and Russia. Bulgaria, we are told, has 'declared values calculated on a uniform plan.' For imports Belgium takes declared values for duty free goods, and for dutiable goods adopts values according to an official list subject to annual revision; for exports the values are partly declared, partly computed. Switzerland adopts declared values for exports, but in the case of imports the values are in most cases officially revised annually, but declared values are taken in difficult cases. France, Germany, Italy, Norway, and Spain all make use of official values revised annually, and the values therefore are usually according to the prices of the previous year. Greece and Roumania have official values revised periodically. Denmark has for imports official values based on the prices of the goods in the exporting country with the addition of the cost of conveyance to Denmark, and for exports values based on the market price in Denmark with the addition of the cost of con-

[1] *Jour. Stat. Soc.*, vol. xlv. (1882), p. 188.
[2] It will be observed that in one case, Peruvian bark, the so-called value is more than seventy times what may be taken to be near the true value.

veying the goods to their destination. Unlike the export values of other countries, accordingly, Danish export values are c.i.f. values, that is, are values including cost, insurance, and freight. While the Danish practice thus differs from what is otherwise general in the case of exports, it is very important to note that the practice of the United States is singular under the head of imports, the import values are based on the market value or wholesale prices in the exporting country, that is, do not include freight. In the case of exports the values for native goods are the declared values at the place of shipment, for goods of foreign origin if taken from a warehouse the values at the place of import, otherwise the values at the time and place of shipment.

67. No student of commercial geography can be unaware how many subjects there are that still await investigation, and in many cases how far the means for obtaining the desired information are lacking. This deficiency is felt in a peculiar degree with regard to the trade and more particularly the home trade of our own country, but in all countries one has often to regret that the available data refer to the country as a whole instead of particular regions which it would be desirable to investigate. It may be useful to conclude this introduction with the enumeration of a few subjects for research, but for the reason just mentioned the labour involved in procuring the necessary data for the investigation of some of these subjects might in some cases be so considerable as to render it impracticable for the present to arrive at any satisfactory conclusions :—

How far British rule in different parts of the world has contributed to the growth of the trade of foreign countries.

The relation between fluctuations in different meteorological conditions and the yield of various important commodities. The occurrence of frost, snow, hail, and fog, and the precise seasonal distribution of rainfall (see **39–39*d***, and p. 460, n. 2) and sunshine (**244–49**) may all have to be taken into account.

The conditions of commercially successful and unsuccessful irrigation.

The trade between countries of the temperate zones as contrasted with that between the temperate and torrid zones.

The advantages of rural and urban centres for different kinds of manufacturing industry.

The effect on commerce of the construction of particular railways.

The difference in the nature and volume of traffic resulting from the substitution of railways through mountain tunnels for cart or sumpter traffic across mountain passes.

The relation of seaports to their hinderlands.

The influence on commerce of the possession by different countries of bulky commodities such as coal, timber, salt, ice, cement, wool, grain, and the like.

The distribution of ocean traffic between sailers and steamers.

The significance of changes in the value of imports and exports per head of population.

The effect of local labour, local supplies of raw material, and local markets in the development of manufacturing industries.

The ultimate destination of the bulk of the produce of particular districts, distinguishing home and foreign markets and the particular parts of foreign countries which form those markets.

The exhaustibility of natural advantages for any particular kind of production, as evidenced by a rapid followed by a slower expansion of a local industry concerned in such production.

The effects of government interference in modifying the influence of natural advantages.

Friction in the transference of labour skilled and unskilled from one producing region to another.

Changes in the character of the emigration to regions to which there is a large flow of immigrants.

The gradual conversion of manufacturing industry from the lower to the higher branches.

HANDBOOK

OF

COMMERCIAL GEOGRAPHY

INTRODUCTION

1. The great geographical fact on which commerce depends is that different parts of the world yield different products, or furnish the same products under unequally favourable conditions. Hence there are two great results of commerce: the first, to increase the variety of commodities at any particular place; the second, to equalise more or less, according to the facilities for transport, the advantages for obtaining any particular commodity in different places between which commerce is carried on. Among the difficulties of transport to be overcome we here include all the profits necessarily levied in the transference of goods from hand to hand (profits of exchange).

2. The variety of products in different places is due either to artificial production, whether by cultivation or manufacture, or to original distribution. The original distribution of minerals of economic value is an important matter for consideration in commercial geography, but under this head we must consider, not merely the latitude and longitude of the place of occurrence, but all the varied conditions, local, political, or historical, which help to render mineral deposits commercially available. Original distribution under the same provisos is likewise the prime consideration in the case of forest products, where the forests have not been planted by the hand of man.

3. In the case of cultivated products, soil and climate are considerations of first importance in determining the variety obtaining at different places. But even with reference to such products these are not the sole considerations. Facilities for finding a market, and all the conditions that affect these facilities, have also to be taken into account.

4. The cost, in labour, of bringing goods from one part of the world to another has been greatly reduced since the time of the earliest commerce of which we can get a glimpse. On the whole, there has

been a gradual development of the means of transport; but the rate of development has been very unequal in different regions and at different times, and in our own age it has attained the highest pitch yet reached. As this development has proceeded, the variety of products entering into commerce and obtainable at particular places has constantly increased. In the earliest periods the articles in which commerce was carried on on a great scale, involving the longest and costliest journeys, were necessarily such as were of great value in proportion to their bulk. Such commerce supplied chiefly the luxuries of the rich, and commodities on which a high value was conferred by religion. Records of early Egyptian, Assyrian, and Phœnician trade speak of gold, silver, and precious stones, ebony and fine woods, ivory and inlaid work, incense and perfumes, balsams and gums, apes, peacocks, panther-skins, and slaves as the principal gifts of commerce. Indian dyes (indigo) appear to have reached Egypt in the time of the eighteenth dynasty (1700–1475 B.C.); Baltic amber was probably brought to Assyria in the time of Tiglath-pileser II. (eighth century B.C.); and Chinese silks are known to have reached the Indus through Afghanistan in the fourth century B.C., though probably without anything being known in the country where the goods were bought of the country in which they originated. The silks were no doubt gradually transferred from tribe to tribe on the route, and in this manner they are likely to have occasionally reached the West at a much earlier date.

5. It is not till Rome had reached the height of its prosperity that we hear of a great trade arising in the necessaries of life. Rome first made Sicily a granary for central Italy during the later period of the Republic, and under the Empire grain was likewise obtained from Egypt and Cilicia, Mauretania and Spain. Sea carriage within the Mediterranean rendered all these sources of supply easy of access; but where distant land carriage was added, especially for the materials of an artistic product, the prices demanded were such as only the wealthiest could pay. Varro in the first century B.C. mentions citron-wood along with gold as among the costliest luxuries at Rome, and about the same date as much as 1,400,000 sesterces (10,500*l.*) was paid for Alexandrian tables made of thya-wood (the wood of *Callitris quadrivalvis*) with ivory feet.

6. Coming down to the most flourishing period of the trade of Italy with the East, that is, towards the close of the fifteenth century, just before the discovery of the sea-way thither (100), we find that the principal articles of commerce were raw silk, silk-stuffs, and other costly manufactures, spices and drugs. At Antwerp in 1560, after the sea-way to the East had been fully established, and that city had attained the summit of its maritime and commercial prosperity, though the commodities that were dealt in include leather, flax, tallow, salt fish, timber, corn and pulse, and other articles of general consumption, there is a remarkable prominence of costlier articles, such as wrought

silks and velvets, cloth of gold and silver, tapestries, dimities of fine sorts, jewels and pearls, dyes and perfumes, drugs and spices.

7. In Shakespeare's time we know from Shakespeare himself that sugar, currants, and dates, rice, mace, nutmegs, and ginger, as well as civet and 'medicinable gum,' were all familiar articles in England, while the manufactured products of the time comprised, among others,

> Fine linen, Turkey cushions boss'd with pearl,
> Valance of Venice gold in needle-work.

Tobacco, though not mentioned by Shakespeare, was already in use in England. Of the articles mentioned, however, some that are now within the reach of every one must have been, at the period referred to, comparatively rare luxuries. Without going beyond Shakespeare we get a hint that rice was dear. 'What will this sister of mine do with rice? But my father hath made her mistress of the feast, and she lays it on.' From other sources we learn the cost of some of the other tropical products mentioned. In 1589 a quarter of an ounce of tobacco cost in England 10*d*., 1 lb. of sugar 20*d*.; and the difference in money value between then and now gives an inadequate idea of the actual difference in cost, for we find from the same source that a pound of sugar then cost (at least in the country) as much as a quarter of veal or mutton.[1]

8. The contrast between Shakespeare's day and our own is striking in many ways. Tea, coffee, and cocoa, besides other minor but still familiar articles, such as sago and tapioca, have all been added, along with a host of others, to the list of mercantile commodities. The price of tropical products has been so reduced that, for example, sugar, coffee, and tobacco have all become necessaries of life even in the Arctic home of the Laplanders. In the trade of the world almost universally the articles of greatest aggregate value have come to be the natural products, raw materials, and manufactured articles in most general use —wheat, rye, and rice, bacon and hams, butter and cheese, cotton and cottons, wool and woollens, iron and iron-wares, besides leather and leather wares, &c. Even in the export trade of India spices have disappeared from the list of the first nine articles, and, as may be seen from the tables in the Appendix, the principal commodities exported from that country are mostly bulky raw commodities. One drug only, opium, still takes a leading place among the exports, and this would be of comparatively small importance were it not for one great market (China).

9. We thus see that the increasing variety of commodities entering into commerce is in a great measure an increase in the commoner articles of consumption. To get an idea of the extent of the variety that has been attained through the gigantic and complicated commerce

[1] Hall, *Society in the Elizabethan Age*, pp. 200–1.

of the present day, there is no better method than to examine the price-list of one of the great miscellaneous retail shops now so common.

10. The equalising tendency of commerce has already been incidentally illustrated by the reduction of price of tropical commodities just referred to; but this tendency needs a little further elucidation.

The tendency may be described, first, as one towards equality of prices from year to year—in other words, to stability of prices; a tendency manifested most conspicuously in the case of those commodities the supply of which in any particular region, apart from commerce, is largely dependent on the weather. Between 1641 and 1741 the price of wheat per quarter in England oscillated between 23*s.* and 76*s.*; in the period from 1741 to 1841, between 22*s.* and 129*s.*, the highest prices being reached during the period of the Napoleonic wars; in the period 1842 to 1888 the limits of oscillation were only 39*s.* and 75*s.*, the latter figure being reached only during the Crimean war.

11. But the tendency of which we are now speaking is, secondly, a tendency towards equality of prices in different regions of production; a tendency in perfect keeping with that just spoken of, being in fact due to the same cause. Excessive prices in one region are kept down by supplies sent from other regions where the commodity is cheap, and the sending away of the surplus from these latter regions tends to raise the price in them. The effect of this nature attributable to commerce is best recognised by observing the conditions that prevail in places where communications are still very imperfect and commerce consequently limited. Quito, a town in the Andes at the height of nearly 10,000 feet above sea-level, can at present be reached from Guayaquil, the principal port on the coast, only by means of pack-animals, which have to travel a distance of 320 miles. Here, accordingly, we find local produce exceptionally cheap, but imported articles excessively dear. Beef sells at from 2*d.* to 2½*d.* a pound, mutton 1½*d.* to 2*d.*, chickens 6*d.* to 7½*d.* apiece; ordinary labourers receive about 6*d.*; carpenters, stone-masons, and other artisans about 1*s.* a day, finding their own food. On the other hand, dry goods, hardware, common cutlery, crockery, and imported furniture are from 25 to 50 per cent. higher than in foreign markets; and common ironware costs fully twice as much as in the countries from which it is brought.[1] So also in Turkey, where the paucity of railways and the mountainous character of the country make communication difficult, wages are comparatively high in Constantinople, extremely low in distant villages and rural districts. In general, the more complete the system of communications the more nearly equal are prices.

12. Now it has to be noted that while the tendency of commerce is towards comparative steadiness in prices, yet the level towards which

[1] *U.S. Cons. Reports*, 53, p. 49. The report is dated April 11, 1885, since which date the means of communication in Ecuador have been improved, but the illustration still serves its purpose.

the price tends is not the lowest level in any place of production. Merchants sell abroad because they can thus get a better price than at home. It is their quest after higher prices that reduces the inequality under this head in different parts of the world. To them the advantage of an extended commerce is this, that the wider the commerce the greater is their choice of customers.

13. Hence there follows a **third great result** of the growth of commerce, namely the **development** of the **resources** of different regions **to the utmost** extent possible under the existing conditions, whatever these may be, and with this development the keenest and most widespread competition, which is, indeed, only another aspect of the same great fact.

14. But in process of this development it becomes apparent that the **equalising tendency of commerce** on which we have insisted is only a general tendency, which is apt to be **masked** now and again **by disturbances**, by great variations in price, due directly or indirectly to the operations of commerce itself.

These disturbances may arise from inventions causing a sudden cheapening in the processes of production, such as the great textile inventions or those which gave rise to the modern methods of steel-making (**390–94**); they may arise from the introduction of cheaper means of transport, and the disturbance due to this cause is felt all the more keenly when the cheaper transport is to regions in which there is exceptionally cheap labour or cheap land, and still more when it leads to the rapid settlement of land of unused and extraordinary fertility; or they may arise from a vast and rapid expansion of the demand for some commodity—an expansion such as is only possible since commerce has come to be pursued on the extensive scale characteristic of the present time.

15. Such disturbances are sure to inflict hardship somewhere. The transition from domestic industry in spinning and weaving to the factory system is too far in the past in our own country for the attendant hardships of that transition to be remembered, or even generally known; but these hardships are still being felt in some parts of the Continent, as in Germany (**586**) and Russia (**683**). In India we have, first of all, seen hand-spinners and weavers starved out of existence by the commerce in English machine-made cottons, and subsequently a vigorous competition with our own cottons in the East arise from the development of a mechanical textile industry based on local advantages (**259*a***). The effects of other causes of disturbance are illustrated in the recent history of the wheat trade, with reference to which see pars. **145–50**, where an explanation is attempted of the circumstances that led to the decline of the price of wheat in England from an average of 45*s.* 1*d.* in 1882 to an average of 22*s.* 10*d.* in 1894. The effect of the last of the causes of disturbance referred to at the end of the last paragraph is seen in the history of the iron trade after 1870. The average price of pig-iron warrants at Glasgow in the years 1869

to 1871 varied between about 58s. and 59s. per ton; in 1872 the average rose to about 102s., in 1873 to 117s., after which it fell steadily to about 54s. in 1877. The sudden rise was due to the fact that, vast as our own commerce and industry had already become in 1872, it was not yet equal to the demands that were then made on it for the further expansion of commerce by the laying of numerous railways, and the establishment of numerous factories in America and Germany.[1] But in the subsequent course of iron prices the general equalising tendency of commerce can still be detected. The vast demand of 1871 to 1873 led almost immediately to such an increase in the means of producing iron, that when the next great expansion of the demand came about it was met with greater ease and with less oscillation of prices. From 1877 to 1887 the extreme variations in average annual price of pig-iron warrants at Glasgow were only about 40s. and 54s. 6d. In this case the hardships of the sudden rise were distributed over the wide area in which iron wares were required. In the centres of the iron industry they were felt only in the extreme depression that ensued on the period of exceptional activity.

16. Inevitable as the hardships attendant on such disturbances are, still the improvements that bring about such incidental results are of value to the world in the long run, in so far as they afford the means of permanently lightening human labour in the production and distribution of the means of satisfying human wants. That they do so for an ever-increasing proportion of the inhabitants of the world would appear to follow from the fact to which attention has already been drawn, the increasing proportion of the necessaries of life and the articles of most general consumption entering into the aggregate commerce of the world. The large and quick-sailing ships, the numberless railway trains, in short all the vast apparatus that now stands at the service of commerce, can be kept working only by transporting commodities consumed in the largest quantity, such therefore as satisfy the wants of the multitude.

17. But if there is any permanent benefit to mankind at large from the development of which we are now speaking, it is worthy of note that the full advantage of this nature is not reaped until every kind of production is carried on in the place that has the greatest natural advantages for the supply of a particular market. By natural advantages are meant such as these—a favourable soil and climate, the existence of facilities for communication external and internal so far as these lie in the nature of the surface and physical features, the existence of valuable minerals in favourable situations, and especially of the materials for making and driving machinery, these being among the products which

[1] The annual increase of railway mileage in America rose steadily from 1,177 miles in 1865 to 7,379 miles in 1871. The annual exports of iron and steel from the United Kingdom to the United States increased steadily from 186,000 tons in 1865 to 1,064,000 tons in 1871; those to Germany, Holland, and Belgium increased year by year from 255,000 tons in 1866 to 1,015,000 tons in 1872.

are least able to bear the cost of carriage. All these advantages are more or less permanent, or at least such as are exhaustible are for the most part liable to exhaustion only by slow degrees.

17*a*. Among natural advantages in relation to a particular market is likewise to be included a favourable geographical situation. But mere proximity to the market in question is not to be supposed always to render the situation of a district trading therewith geographically favourable. The advantage of a geographical situation is determined by the facilities for transport, and therefore a distant country that can convey goods by sea is in many cases more favourably situated for some market than one immediately adjoining the market, but able to supply goods only by more or less difficult land-carriage. To enforce this fact an illustration may be taken from a trade in which, through the nature of the communications and the magnitude of the trade, the disadvantage belonging to the land-carriage is reduced almost to a minimum—the conveyance of raw cotton from Bombay to Oldham. At the end of 1887, a period when the freights between Bombay and Liverpool were not exceptionally low, the cost of carriage of 100 lbs. of cotton between these two ports, a distance of about 7,150 statute miles, was 49*d*., the additional cost of carriage from Liverpool to Oldham, a distance of 39 miles, 7*d*.[1] Such a fact as this indicates, at least in part, the explanation of the success of British products in many parts of the world where they have to compete with others from nearer centres of production (see **491**, **590***a*, **688**, &c.). Where, however, the mode of transport for districts competing for the same market is the same, there is an advantage belonging to the nearer place of production that cannot be annihilated, although it may be reduced by increasing facilities for transport. The Bombay cotton-spinning mills, for example, have an advantage in freight to China over those of Lancashire, and those of Japan over the mills of Bombay.

18. With natural advantages may be contrasted **historical advantages**, which are in their nature more temporary, though they are often in fact very enduring. As most of the advantages of one kind or another fall to be mentioned under the head of the British Isles (**488**, **489**), it is needless to enumerate them here; but for the sake of illustration it is necessary to indicate a few of those which may be classed under the head of historical. Perhaps the most important of all is a strong government based on just and fixed principles not hostile to industry; and this, it may be observed, is one of those which may be very enduring in fact, as the disadvantage arising from the want of that condition is very apt to be. Among others are the possession of machinery, of communications, of cheap land, of a skilled population. Machinery where wanting may be rapidly erected, communications rapidly established, cheap land become dearer from settlement; a skilled

[1] Manchester Chamber of Commerce, Bombay and Lancashire Cotton-Spinning Inquiry, Minutes of Evidence and Report, pp. 237, 285.

population may distribute its advantages by migration, as happened in the sixteenth and seventeenth centuries in consequence of religious persecution in the Netherlands and in France, and as is happening now, when the United States and other new countries are having their industrial population recruited and raised in character at the expense of the countries of Europe with the most advanced industrial organisation.

19. **Inasmuch as some advantages for commerce and industry are thus temporary** in their nature, it is **necessarily more or less perilous for a country to have its commercial and industrial prosperity based chiefly on advantages of this kind**; and there are numberless examples in history to show the hardship and disaster that may result from the withdrawal of the advantages on which a temporary superiority was based. We may refer in illustration of this to the losses that fell upon Italian commerce after the discovery of the sea-way to the East (122), the prosperity of that commerce being based in a large measure on the central position of Italy—a position which was permanent only so long as the geography of the world was imperfectly known. We may also refer to the experience of the United Kingdom in the depression that has in recent years[1] affected some of her greatest industries (503–6). It is specially disadvantageous for any country when the temporary prosperity of any of its chief industries is based on a circumstance that must in itself be regarded as disadvantageous—such, for example, as low wages.

20. With reference to the temporary character of certain advantages for commerce and industry, it is likewise a fact of the greatest moment that, viewed broadly, the **commerce and industry of the world have for more than a hundred years been in a transition stage** the like of which has not been known since the discovery of the sea-way to the East and of the New World. Communications are being improved, the means of production are being accelerated and cheapened, uncultivated lands are being settled, strong governments are being established and extended with a rapidity hitherto unparalleled—with incidental results, as we have seen, not always the most desirable. Commerce and industry thus tend to be governed more and more by purely geographical conditions, which accordingly demand the most careful and detailed examination, an examination much more thorough than can be attempted within the limits of this work.

21. The advantages that may be expected to be reaped when the development of commerce has reached its goal are the enjoyment of the greatest possible variety of commodities at all the habitable parts of the earth (that is, the greatest variety possible for each place), and the utmost attainable stability of prices. When the network of commerce is complete in its main lines, when it has only to be gradually

[1] Written in 1889.

and regularly extended or made more intricate with the development of population, the deficiencies in the natural products of one region will be supplied with the least possible delay and at the least possible cost from any surplus that may accrue in other regions. It is true that this will take place only on condition that the region so supplied has something to give in exchange for that which is supplied; but with reference to this proviso, it is an important consideration that the **stability of prices** towards which a fully developed commerce tends is in itself in the highest degree **favourable to that foresight** which is the necessary condition of ensuring that stability. It facilitates a just estimate of the future. Rendering foresight easier it makes prudent conduct more certain of reward, and may be expected, therefore, to render its practice more general among the community.

22. Meantime, however, it cannot be forgotten that, however fast commerce may seem to be hastening towards its goal, it is still very far from having reached that goal. What we now see, accordingly, is the greatest haste on all sides to secure such advantages as may offer themselves for the prosecution of commerce and industry; we see an extreme phase of competitive and aggressive commerce as between nation and nation, individual and individual.

23. It is only with nations that we have here to do, and we may now note **the principal means by which nations**, whether through their governments or through other institutions, endeavour to **promote their own commerce and industry.**

24. As the first of these means may be mentioned **protective tariffs**; that is, duties levied upon imports upon such a scale as to encourage the production of the goods so taxed in the country itself by the total or partial exclusion of such goods of foreign origin. It is obvious that by this method only certain branches of internal commerce of a country are fostered, and the external commerce of the country is hampered. But it may be pointed out that in so far as such duties may be necessary or may help to establish an industry in a region in which it is fitted by natural advantages to take root and flourish independently of such fostering, the imposition of duties of this nature tends in the direction of the goal towards which commerce as a whole is moving. The direct and immediate effect of high tariffs is, however, opposed to the tendency of the changes in progress referred to in paragraph 20, and especially to the rapid multiplication of means of communication. When efforts of one kind are being constantly made to cheapen the supply of commodities it is scarcely credible that those who consume the commodities will always consent to have their price raised by an arbitrary barrier.

25. **Bounties**—that is, payments made directly or indirectly on the exportation of goods—are another means sometimes resorted to by governments with the view of encouraging native industries; and with reference to these also it may be said that if it can be proved that a

bounty has ever served to establish an industry capable afterwards of being maintained on a self-supporting footing, then a similar plea may be entered in favour of this aid to industry. One of the commonest forms of bounty now in use is the paying of a subsidy to certain lines of shipping (generally, however, in return for services in the carriage of mails or otherwise). The sugar industry (**308**) is the most important of those which have been affected by bounties in recent years. Great changes in the extent of government interference with trade by way of protective duties or bounties are, apart from war, perhaps the most deplorable, because the most abitrary, of the disturbances of the commercial relations subsisting at any period.

26. Further, governments assist commerce by maintaining officers known as **consuls** in the principal mercantile towns of foreign countries; the officers so named being charged with the duty, not merely of looking after the interests of subjects of the country represented by them in the sphere of their consular districts, but likewise with that of furnishing such information as is likely to be of use to the merchants of that country. These reports usually furnish particulars as to the amount of trade carried on in various articles at the most recent date, as to the facilities of communication, shipping, and exchange; descriptions of commodities most in demand, sometimes accompanied by samples of the goods themselves. The name consul is of Latin origin, and the present application of the title originated, with the practice of maintaining such officials, among the trading communities of Italy in the twelfth century. In the Austrian Empire there is an academy under the control of the Minister of Foreign Affairs for the education of candidates for the diplomatic and consular services. Being primarily intended for those preparing for service in the East, it is known as the Oriental Academy; and the course of instruction embraces a legal training, military geography, and tactical science, as well as the teaching of 'Turkish, Arabic, Persian, Hungarian, French, Italian, English, Russian, Modern Greek, and Servian.'

27. The establishment of **chambers of commerce**, or voluntary associations of merchants in different localities, is now almost universal, and similar chambers are now getting established by merchants of different countries in foreign cities where a large amount of business is conducted.

28. Another method of promoting national commerce now coming into more and more general use all the world over is the establishment of **commercial museums**, the nature of which will be understood from an account of one of the largest and best institutions of the kind in Europe. That referred to is the State Commercial Museum at Brussels, the first of several erected in Belgium with the aim of furnishing Belgian manufacturers 'with the means of practically learning the articles of commerce preferred in various foreign countries, and the conditions under which such articles can be profitably exported.' The

collection of articles exhibited in the museum has been selected with three objects: '1, exportation; 2, importation; 3, packing and preparation of samples.'[1] 'The classification adopted is not geographical, but by similarity of produce, apart from nationality. That is to say, that all goods of similar type (say linings) are juxtaposed, in order that manufacturer, merchant, buyer, and workman may compare the material, skill in weaving, price, dye, finish, and make-up of the merchandise of different nationalities. A manufacturer, say of blankets, is thus enabled to confine his inquiries concerning those textiles, and if he wishes for information in relation to them he rings an electric bell fixed in the case, which intimates to the attendant both who has called for his services, and the register which will be required. The numbers on the patterns correspond throughout with the registers containing data as to origin, price, duty, carriage, packing, season of sale, as also with the catalogue and the duplicates from which cuttings, for imitation, can be obtained.'[2] Exhibitions are a kind of temporary commercial museum, and **floating exhibitions** intended to convey samples of a country's commodities to various stations in distant markets are one of the latest means resorted to in different countries with the view of promoting national commerce.

29. In the United Kingdom there are as yet no general commercial museums, and at present samples obtained from consuls are sent to the chambers of commerce of the most important towns specially interested in the industries to which the samples belong. The **Imperial Institute**, founded in 1886 and placed on January 1, 1903, under the management of the Board of Trade, includes, among other things, a commercial museum of the products of the British Empire.

30. Technical education is another highly important means of advancing national commerce, and one which has also been hitherto comparatively neglected in the British Isles. A royal commission appointed to inquire into this subject issued a valuable report in 1884; and though the commissioners were able to refer with satisfaction to the benefits conferred upon industry by the more or less flourishing schools of science and art in London and nearly all the great industrial centres of the United Kingdom, they were obliged to admit that several foreign countries—notably Germany, France, Belgium, and Switzerland—were then as regards this branch of education in a much better position.[3] The evidence collected by this commission fully confirmed the

[1] *Cons. Rep.*, Ann. Ser. 76, p. 20.

[2] *Lond. Chamb. of Com. Journ.* 1886, Oct. Supp. p. 10.

[3] Both British and foreign testimony make it doubtful whether this is still true. The following is Dr. Shadwell's summing up on this subject:—'While England has long been backward in technical education, it has of late years righted itself with so much energy that the provision from below [for the inferior grades of industrial employment] is already greatly superior to that of Germany, and the provision from above [for those who have the direction of industry] has

maxim of Commenius, recognised in one form or another by all scientific educationists: 'Let those things that have to be done be learned by doing them.' It furnished strong reasons for making, in accordance with this maxim, the teaching of drawing and the imparting of manual instruction part of general education. All having to use their hands should be taught the use of them by practice. It showed, too, that while in certain cases the teaching of industries seems to be best carried on in direct connection with workshops in which these industries are practically pursued, there are other cases in which industrial success has been distinctly promoted by the existence of schools in which the course of instruction has a bearing on local industries, although the schools are established on an independent basis. Such examples are most conspicuous in the case of schools of design and schools in which the principles of chemical industries, such as dyeing, are taught. With regard to the influence of schools of design, the commissioners make special mention of the fact that it is in a great measure owing to the establishment of such schools in Nottingham and Macclesfield that the manufacturers of the delicate fabrics of these towns (lace and silks) no longer rely on France for designs. Nevertheless it is to the mainland that they turn for examples of the most complete arrangements for technical education and illustrations of the most marked effects of technical colleges on industry. At Krefeld, at Chemnitz, at Verviers, at Zürich, and other places there exist admirably organised technical schools; and though it is not always easy to demonstrate the precise effects due to them, there can hardly be a doubt that the existence of such schools has a good deal to do with the flourishing state of various industries in Prussia, Saxony, Belgium, and Switzerland. The commissioners who visited the Higher Trade Institute at Chemnitz report as follows:—'In conversations with employers and foremen, the importance of the weaving school . . . was everywhere acknowledged. One of the employers stated that its influence on the manufacturing industries of Saxony could not be too highly estimated. We were told that there was not a fancy manufacturer in the town whose son, assistant, or overseer had not attended some of the classes.' Since the date of this report the central institution of the City and Guilds' Institute, which is intended to fulfil functions similar to those of the great polytechnic schools of the Continent, has been opened in London.

31. Commercial education is another means of promoting national commerce of even greater importance perhaps than technical education, and in this respect Germany would appear to be at present admittedly ahead of all other countries. In the special schools of commerce which are found in nearly all the large towns in Germany, thorough instruction is given in the means and methods of business, in com-

at least equal potentiality if the same use is made of it. And that has begun.' *Industrial Efficiency*, cheap edition, 1909, p. 640.

mercial geography, and above all in modern languages. The result is that the German educated for business is on the average superior in all-round business capacity to his rivals belonging to other countries; and this, though not the sole explanation, is undoubtedly one of the most important explanations of the abundance of Germans in business centres outside of their own country. An inquiry recently made by the London Chamber of Commerce among business houses in London furnished important evidence on this point. It turned out that no fewer than 85 per cent. of the firms that replied to the circular of inquiry sent to them employed foreigners, principally Germans, and the opinion was strongly expressed by many witnesses that the foreigner was the man best fitted to meet the varying demands of modern commerce. With regard to the teaching of foreign languages in English commercial schools, it is probably the case that the fact of the English language itself giving the command of many of the best markets of the world has exercised a prejudicial effect on the desire to learn other languages; but it is becoming more and more manifest that this defect in English education will have to be supplied; and, in particular, it may be pointed out that without a knowledge of Spanish and Portuguese, it will become increasingly difficult for English merchants to retain their hold on the important and growing markets of South America. There is no reason why Germany should permanently retain its advantage in respect of commercial education; and it is the business of other countries to make that advantage only temporary.

32. Several of these means of retaining and promoting commerce remind us forcibly of the closeness of the bonds with which commerce is steadily drawing different countries together, and of the **complicated action and reaction between different parts of the world to which commerce gives rise.** The improvement of machinery, of processes of production, of means of communication, the better organisation of industry, the advancement of education in one country, demand similar advances in other countries. New wheatfields in America necessitate improved systems of agriculture and the advancement of agricultural education in England, the introduction of better agricultural machinery into Russia. The perfecting of the processes in the refining of beet-sugar in Germany demands better organisation among the cane-planters of the West Indies and Guiana. The working classes more and more clearly recognise that any advantage secured for themselves in one country must be extended also to other countries. The United States Consul for Dundee in his report for 1885 states that the longer hours worked in the Calcutta jute-mills were believed to be the determining cause of the depression in the jute industry of Dundee, arising from the competition of Bengal; and he adds that both employers and employed were consequently anxious that the ten-hours-a-day Factory Act should be extended to India.[1] On the Continent of Europe an

[1] *U.S. Cons. Reps.* 61, p. 418.

agitation has been going on for some time in favour of international legislation on this subject.[1] And in connection with this attention should be drawn to the highly important suggestion made by Mr. Wardle of Leek in his report on the silk industry to the Royal Commission on Technical Education: the suggestion, namely, that 'trades organisations should encourage the display in all museums of fabrics, showing not only the quality, design, and colouring, but also every branch of detail as respects prices paid, and all costs of production.' 'This,' he states, 'while helping to steady the action of English trades' unions, would stimulate the operations and aspirations of similar bodies on the Continent.'[2]

[1] *Ibid.* 50, p. 393. Early in 1889 the Swiss Government addressed to the manufacturing states of Europe an invitation to send representatives to a conference to consider the regulation of legislation for the well-being of the working-classes.

[2] *Report of Commissioners*, iii. p. lxxvi.

GENERAL FACTS RELATING TO THE PRODUCTION, DISTRIBUTION, AND EXCHANGE OF COMMODITIES

33. **CLIMATE.** Under this head we have to consider here only the main climatic factors affecting the production and distribution of articles of commerce. The commodities whose production is most immediately affected by climatic conditions are those derived from the vegetable kingdom; but those of animal origin, being directly or indirectly dependent on vegetation, are subject to the same influences. It is, however, climate as influencing vegetation, and more particularly as influencing cultivation, or the bestowal of human labour in promoting vegetation, that we have to keep chiefly in view in considering the effect of climate on the production of commodities.

34. For all kinds of vegetation there is required a certain amount of heat and a certain amount of moisture, the laws regarding the distribution of which over the globe are explained in text-books of geography. In the present work it is enough to call to mind a few leading facts.

35. The great source of heat is the sun, and of moisture the ocean, where evaporation is brought about through the heat of the sun. The winds, however, are the carriers both of heat and moisture, so that it is essential to study the direction of the prevailing winds in order to understand the distribution of temperature and rainfall over the globe. Temperature decreases on the whole from the vicinity of the equator towards the poles, but the rate of decrease is very unequal over land and water. Water being more slowly heated and cooled than the land, the diminution in temperature towards the poles is more rapid over the ocean than over the land in summer, less rapid in winter. The vicinity of the ocean for this reason has an equalising effect on the temperature of adjacent lands, but this effect is brought about solely by the agency of the winds. With reference to land temperatures accordingly it is more important to consider the direction of the prevailing winds than the mere distribution of land and water. Winds depend on local differences in the pressure of the atmosphere. They tend to blow from regions of high pressure to regions of low pressure. Regions of low pressure occur over the warmest parts of the ocean near the equator, and in the interior of the great land-masses in summer, when they are most directly exposed to the rays of the sun. Over the ocean the

region of high temperature and low pressure forms a belt, towards which winds blow more or less from the north and south. The direction of these winds is, however, modified by the rotation of the earth, in consequence of which these winds, known as the **trade-winds**, blow more or less from the east, in some parts of the Pacific almost directly from the east. It is important, therefore, to observe and constantly to bear in mind that over a great width of the ocean in low latitudes extending on both sides far beyond the tropics, there is a strong tendency for the winds to blow away from the west sides of the continents and towards the east sides of the continents. The position of this wide belt, or rather of the two wide belts separated by an intermediate belt of calms corresponding to that of lowest pressure, is not constant. It moves north and south with the sun, along with the whole system of atmospheric pressures dependent on the altitude of the sun. Wherever and whenever the trade-winds blow, however, they have a certain effect in mitigating the temperatures of the regions exposed to them.

35*a*. Outside of the trade-wind region there is normally in the winter months an area of low pressure in the North Atlantic to the north of 60° N., and in the North Pacific a similar area more to the south. Towards each of these the winds tend to blow, but in consequence of the rotation of the earth not directly, but in great spirals in which the direction of movement is opposite to that of the hands of a watch. Hence south-westerly, and consequently warm, winds prevail at this season on nearly all the west coasts of Europe and a large part of the west coast of America, while northerly, and hence cold, winds prevail on the opposite coasts, that is, on the east coast of North America, and the east coasts of northern Asia. The contrast between the temperatures of these coasts in corresponding latitudes is another great fact constantly to be borne in mind, as well as the fact that the benefit of the relatively high winter temperatures is carried by the winds a greater or less distance inland. Warm ocean currents flowing in the same direction as these winds blow help to maintain their temperature, but it is to be observed that without the winds these currents would have no effect whatever on the temperature over the land. In the summer months the area of low pressure still exists in the North Atlantic, so that in that period also south-westerly winds prevail, though not so strongly on the west European coasts. In the North Pacific during the summer months an area of low pressure can scarcely be said to exist. In the southern hemisphere outside of the trade-wind belt the conditions are greatly altered by the fact that the amount of land is very small. It is enough to say that there the prevailing winds throughout the year are westerly.

35*b*. The influence of the pressure of the air over the land in determining the direction of the prevailing winds is most marked where there are great bodies of land to the north or south of seas in lower

latitudes, above all in eastern Asia and in Australia. The interior of eastern Asia in summer is a region of very low pressure, in winter of very high pressure. Hence, in summer ocean winds, south-westerly, southerly, south-easterly, blow over all the south-east of Asia, including the islands, from the Indian peninsula to about the parallel of 60° N. During the winter land-winds, north-easterly, northerly, north-westerly, prevail in the same region. These are the **monsoons**, which have an important effect on temperature as well as on rainfall. The summer winds, though blowing from lower latitudes, do not tend to raise the temperature, because they come from the ocean; but the winter winds being land-winds as well as coming from higher latitudes have a marked effect in lowering the temperatures, more particularly in the temperate zone. For this reason also the winter temperatures in the east of Asia are much lower than those in corresponding latitudes in the west of Europe and Africa, a fact of great importance in commercial geography. In Australia similar results are due to the alternation of high and low pressures in the interior, but owing to the difference of hemisphere the seasons and the directions of the winds are reversed.

36. In consequence of the facts stated with regard to the prevalent winds, there is, in the temperate zones, and more particularly in the northern hemisphere, a general lowering of the mean temperature from west to east, and this lowering of the mean temperature of the year is due chiefly to an **easterly increase in the cold of winter**, which is to some extent compensated by an easterly increase in the heat of summer. The increase in the extremes of heat and cold is greatest in the eastern or broader of the two great land-masses, and the **coldest region of the earth** (so far as explored) lies towards the east of Asia, some distance inland, since the sea everywhere has some effect in mitigating extremes of temperature. While the eastern land-mass thus exhibits greater cold and greater contrasts of summer and winter temperature in the east of Asia than are presented in the east of America, its western or European portion, being exposed to warmer winds traversing a warmer ocean than those which visit the western coasts of North America in high latitudes, is characterised by a more equable climate and higher winter temperatures than corresponding latitudes on the latter coasts; and, in general, we find that when we compare equal latitudes in the west of America and the west of Europe, the latter continent shows the higher temperatures; but when we make a similar comparison for the east of America and the east of Asia, the higher temperatures are found in America.

36*a*. By way of illustrating these great general facts by means of others having more bearing on the production and distribution of mercantile commodities, it may be mentioned that the **northern limits of various cultivated plants** whose range is somewhat rigorously determined by climate, such as the **orange** (176*a*) and the **vine** (179), are

higher in Europe than in the west of North America, but lower in the east of Asia than in the east of North America; that whereas the whole of the west coast of Norway, extending to beyond 70° N., is at all times free from ice, the northern coasts of the peninsula of Alaska, in about 57° or 58° N., are regularly beset by ice in winter; but, on the other hand, whereas the eastern coasts of North America are rarely encumbered by ice below the Gulf of St. Lawrence, in about 46° or 47° N., ice is to be seen in the Chinese Gulf of Pechili below lat. 40°; and, again, Halifax, in Nova Scotia, in 44½° N., is nearly always open, and thus can serve as a winter-port for the Canadian Dominion; while the Russian seaport of Vladivostok, in the east of Siberia, to the south of 48° N., is closed by ice for about a third part of the year. With regard to cultivated plants, however, it must be mentioned that those which are able to profit by long and hot summer days during a very short summer can be grown in higher latitudes in eastern Asia than in eastern North America. Wheat, rye, barley, and even cucumbers, can be grown at Yakutsk in eastern Siberia, in 62° N. (the same latitude as the mouth of the Yukon in Alaska, and Frederikshaab in Greenland), the barley and wheat being sown in the first days of May, and ripening about the middle of July—within two months and a half.

37. The land surfaces of the southern hemisphere are too narrow to exhibit the easterly increase in the extremes of temperature, especially since they do not extend into those latitudes in which that increase is most marked. One circumstance is, however, noteworthy regarding the climate of the temperate zone of the southern hemisphere, namely that it is generally colder, at least on the land, than in corresponding latitudes of the northern hemisphere; so that the limit of cultivation of various plants is in a lower latitude to the south than to the north of the equator. A glacier descends in Chile to the water's edge in about lat. 46° S., a latitude corresponding to that of the middle of France in the northern hemisphere. The orange is not cultivated for its fruit in Victoria, except in the extreme north-west, in a latitude one or two degrees below that of the southernmost point of Europe. In the South Island of New Zealand, which is in as low a latitude as the northern half of Italy, oats is the principal crop, as it is in Scotland and Ireland.

38. As the winds are the carriers of heat and cold it follows that the physical configuration of the land may indirectly affect temperature. Mountains, by obstructing winds, in some cases afford protection from cold winds, in others prevent certain districts from getting the benefit of warm ones. Temperature is also greatly modified by evaporation and condensation of water vapour, evaporation always tending to bring about a lowering and condensation a rise of temperature.[1] Heat

[1] The conversion of water into vapour, like the conversion of ice or any other solid into the liquid state, involves the expenditure of heat. That is, heat (in the scientific sense of the term) is used in the conversion, and is not available for

is lost during the night by radiation, and since there is greatest loss of heat in this way where the atmosphere is dry, clear, and rare, there are great extremes of heat by day and cold by night in the interior of continents, especially at high elevations. A great reduction of temperature is always the result where air expands in consequence of winds being driven upwards to regions of lower pressure. Low temperatures prevail at high altitudes, but it is to be remembered that these low temperatures are those of the air. There is no diminution, but the reverse, in the strength of the rays of the sun on any body directly exposed to them.

39. As the great source of **moisture** is the ocean, for the most part the further inland a region lies the less chance has it of receiving an ample rainfall, unless there are special conditions favourable to the condensation of water-vapour. Water-vapour is condensed through the more or less rapid lowering of the temperature, and one of the most frequently operative causes in bringing about that reduction of temperature is the presence of mountains, obstructing moisture-laden winds, and thus forcing them to ascend and become cooled by expansion. Consequently regions on the maritime side of mountains often have a sufficient rainfall when those on the other side have not. In the tropics there is generally a more marked distinction between rainy and dry seasons than in most parts of the temperate zone; this distinction is most marked of all in the **monsoon regions**, in which the winter winds are naturally for the most part dry winds, whereas those of the summer months come heavily charged with moisture and bring about a very high rainfall in the parts more directly exposed to them. In these regions accordingly we have the combination of heat and moisture specially favourable to vegetation, and this characteristic is particularly noticeable in the parts of the monsoon areas belonging to the temperate zone, which are in consequence greatly more productive than regions in the same latitudes elsewhere.

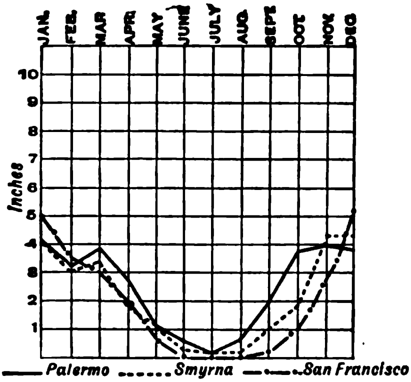
39*a*. The important matter of the distribution of rainfall throughout the year is illustrated by the diagrams on page 21. With the diagram illustrating the monsoon type of rainfall may be compared in the first place those for places in the trade wind belt. The curves in the diagram of places on the east side of continents in that belt are all typical. During the summer months the areas of low pressure which are then found in the interior of continents have the effect of strengthening the trade-winds that tend to blow on the east side, which accounts for the marked preponderance of summer rain indicated by the diagram. On the east side of such regions accordingly we have a repetition of the combination met with in the monsoon areas. The rainfall curves in the diagram for places in the trade wind belt on the west side of continents illustrate the variety of effects due to

raising or maintaining temperature. Meanwhile, of course, temperature may be maintained, and even raised, by external supplies of heat (as from the sun, or a fire).

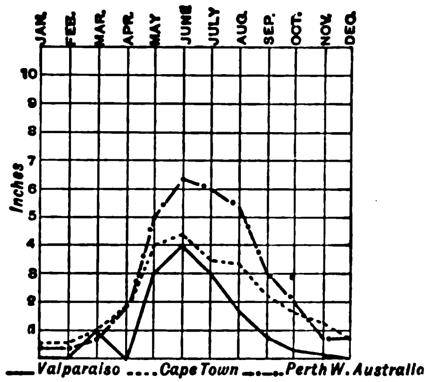
physical configuration and outline rather than the characteristic rainfall distribution of those regions. In those regions it must be remembered that the tendency for the winds to blow away from the land is partly counteracted during the summer by the areas of low pressure in the interior tending to set up an indraught from the west. That indraught is, however, mostly feeble, and the rainfall is consequently so scanty, except in very low latitudes, that those coasts are almost unpeopled, one consequence of which is that there are no rainfall stations to furnish typical curves. The curve for Mazatlan, however, shows that in exceptional cases this indraught may have a great effect in promoting a high summer rainfall. Mazatlan is situated near the Tropic of Cancer on the west coast of Mexico at the base and on the exposed side of high mountains with reference to Pacific winds. In the summer there is an area of low pressure to the north, establishing monsoon conditions the effect of which is shown in the high rainfall at that period.

39*b*. The **Mediterranean type of rainfall** presents a complete contrast to the monsoon type, for in all those regions where that type obtains the rains occur in winter. All the regions so characterised lie on the west side of the great continents on the outer margin of the trade wind belts, in such a position that they may be described as lying behind the trade winds in summer, although exposed to anti-trade winds (south-westerly in the northern hemisphere, westerly or north-westerly in the southern) in the winter. These winter anti-trades are rain-bearing. In summer, however, the ocean winds in the neighbourhood of those regions tend to blow away from the land, and those blowing landwards, that is, from the west, are therefore feeble, do not come from a great distance, and are not heavily charged with moisture. The most extensive of all the regions having this character is that which gives its name to the type, but, extensive as it is, it may be fairly described as lying on the west side of the great land-mass or double continent of Europe and Asia. In that region, moreover, the direction of the summer winds is greatly affected by the existence of the highly super-heated area of the Sahara lying to the south. The other areas characterised by this type of rainfall are California, central Chile, the extreme south-west of Africa and Australia, and in a less marked degree the part of South Australia round Adelaide. All such areas must be less productive on the whole than corresponding latitudes in monsoon regions.

39*c*. The continental type of rainfall outside of the strictly monsoon areas is partly due to conditions similar to those which bring about the monsoon rains. The great rarefaction and consequent low pressure over the land during the summer favours the penetration of sea winds far into the interior at that season; and any causes that may then tend to bring about a sudden rise of moisture-bearing air, or in any other way to effect a rapid cooling of the atmosphere, are then apt

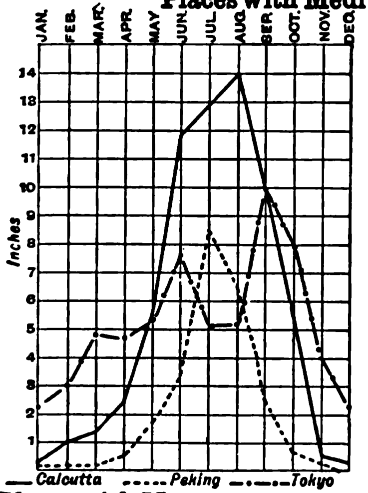


Northern Hemisphere

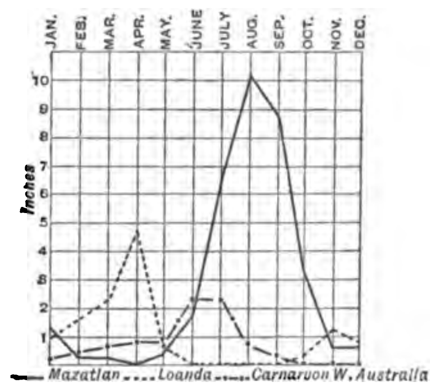


Southern Hemisphere

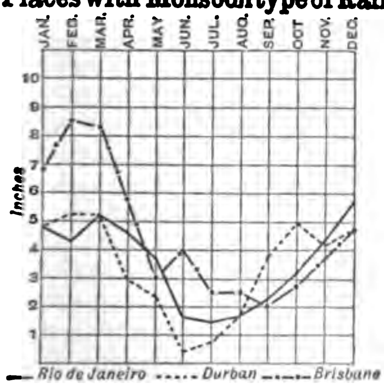
Places with Mediterranean type of Rainfall.



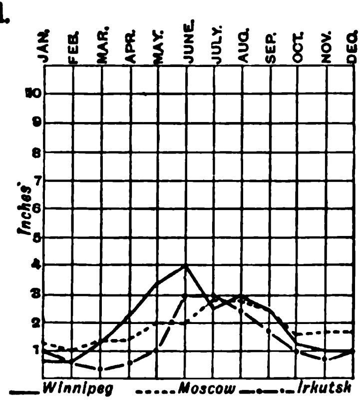
Places with Monsoon type of Rainfall.



Places in the Trade wind belt on the west side of Continents.



Places in the Trade wind belt on the east side of Continents.



Places in North Temperate zone with continental type of Rainfall.

TYPICAL RAINFALL DIAGRAMS.

to lead to a fall of rain. In the extensive regions so characterised, however, there is neither the great quantity of rainfall usual in the monsoon regions nor the same degree of difference between the summer and winter rainfall as in those areas in which the monsoon characteristics are most distinctive.

39*d*. So favourable are the low temperatures of high latitudes to the condensation of water-vapour that areas of deficient rainfall are almost confined to lower latitudes. Scarcely anywhere beyond the parallel of 50° N., except perhaps in a limited area on the confines of Asia and Europe, is cultivation restricted from the lack of the necessary rain. For even in the heat of summer the high temperature of the soil leads to the ascent of currents of air, and these carry up with them moisture that soon reaches a level at which it is again liable to become condensed. Bright days with not infrequent showers consequently characterise the summers from European Russia to the east of Siberia, to the north of the limit named. But a large part of that region is sterile, or at least incapable of cultivation, from an opposite reason—the cold and marshy character of the soil. South of the parallel of 50° N., on the other hand, there are both in the Old World and the New vast areas which are desert or nearly desert from excess of drought, except perhaps in the neighbourhood of mountains which condense the rain, or of rivers which supply water for irrigation (**60–63**).

40. The **tropical regions** of the earth are those in which on the whole the amount both of heat and moisture is greatest. It is there also that as a rule temperature is most uniform all the year round, so that, where moisture is sufficient, there is a constant succession of vegetation, and trees may bear fruit at all seasons. Moreover, it is in these regions that cultivation ascends highest on mountain slopes and plateaux, all the crops of different climates being capable of cultivation at different heights on tropical mountains. All these circumstances would appear to be favourable to the production in large amount of articles of value in commerce, and hence to the maintenance of a vast trade between temperate and tropical climates. But the fact is otherwise. The circumstances unfavourable to the production of commercial commodities in the tropics far more than outweigh those which have just been mentioned as favourable to that production. In the first place, where the rainfall is plentiful, the very luxuriance of the natural vegetation, forming dense forests almost impenetrable by man, not to be cleared without the most strenuous labour, and ready to spring up again in all their former vigour and exuberance wherever cleared ground is exposed to neglect, presents an obstacle to cultivation such as is seldom met with in temperate climes. Secondly, when this obstacle is not found there may be one of an opposite nature. Notwithstanding the vast amount of moisture that is sucked up by the air from tropical seas, and is almost always present in considerable quantity in the air of tropical lands, there are vast areas within the

tropics in which little or no rain falls, regions which are either desert from drought or covered with only a scanty herbage, so that they would reward but poorly the labour of cultivation. Such regions lie either where mountains occur to cut off the ocean moisture from plains and plateaux in the interior, as in the heart of Africa and Australia, or where the prevailing winds carry the moisture away from the land, as on parts of the west coasts of Africa and America (39*a*). In such regions, however, the absence or scantiness of rain is not everywhere due solely to the small quantity of water-vapour in the atmosphere, but largely to the fact that the hot air over the burning plains can retain so much moisture in the form of invisible vapour, and hence on cold clear nights the herbage is often refreshed by plentiful deposits of dew. Thirdly, even when all else is favourable, the climate is of such a nature as to render the inhabitants disinclined to labour. The excessive heat and moisture are enervating, and cause steady labour to be peculiarly irksome even to natives, whose simple wants, moreover, are so abundantly supplied by the natural luxuriance of the vegetation, with little labour on their own part, that there is not the same motive to exertion as is presented in other lands. The following picture of native life in the tropics of South America (the United States of Colombia) may be taken as typical to a large extent of tropical life elsewhere :—

40*a*. 'In the country a man can locate his house in the woods without fear of disturbance, erect the same in one day from the wild growth surrounding him, and soon have a clearing made in which he can grow three crops of corn [maize] in a year. He must not plant more than his children can protect, however, from the wild parrots and animals which like cultivated food. The plantain and banana produce within eight months from the seed, and thereafter without much care yield a continual harvest. The yam and yuca, a species of potato,[1] yield quickly, and are very hardy. Sugar-cane once planted is always present. With these products growing around him, and the river near to supply him with fish, the native is happy, depending for his meat upon the wild animals he can kill with spears made from the lance-wood of the country, or which he can entrap. . . . His only necessity for money is to provide salt, rum, tobacco, clothes, and the machete, or long knife, which he uses for every purpose, from picking his teeth to cultivating his lands. The money is gained by working for some rich neighbour, by cutting wood for the river steamers, and catching and drying fish for the city markets, or by cultivating the ground in excess of his own requirements.'

41. From the causes indicated population in most parts of the tropics is relatively scanty, and commercial products, such as coffee and sugar, are mainly grown under the direction of Europeans, or

[1] In reality the tuber of a plant belonging to the same genus as manioc, the shrub that yields tapioca (309).

people of European origin (as in India and Ceylon, Java, Brazil, and Guiana). Many of them are the products of hill slopes at a greater or less elevation, such sites presenting combinations of soil and climate not to be found elsewhere. While the temperature is more moderate than on the low grounds, it has all the uniformity characteristic of the tropics, and is even more constant than in the valley bottoms. For, though temperature generally decreases as one ascends from lower to higher levels, there are circumstances in which the opposite is the case. When the upper layers of the atmosphere are greatly chilled, as on clear still nights, the air belonging to them may become so condensed as to become heavier than that of the lower layers, and hence sinks down to the valley bottom, so that frosts occur on the low grounds even in the tropics, while the upper slopes escape. Besides this uniformity of temperature, trees and plants grown on the slopes of tropical mountains exposed to warm ocean winds enjoy frequent and copious supplies of rain, combined with the advantage of excellent drainage, so that there is little fear of their roots suffering from excess of moisture. The only danger to be guarded against is the possibility of the soil being washed away from the roots at the same time.

42. To Europeans the residence on tropical hills is perhaps more healthy than residence on the low grounds in the same latitudes; but even at the elevation at which coffee is grown, a tropical climate is for them neither healthy nor agreeable. The enervating effects of the heat and moisture render them unfit for work such as they could engage in with comfort in more temperate regions; and notwithstanding the uniformity of the temperature as indicated by the thermometer, the unpleasant sense of heat often alternates with as unpleasant a sense of cold, for the excessive moisture of the atmosphere renders one sensitive to variations of temperature which would be scarcely felt in a drier climate. Humboldt mentions in one place that he and his companions, after a short residence in the torrid zone, found that their senses had become so easily affected by the slightest change of temperature that they could not sleep for the cold on one occasion, even when they discovered, to their astonishment, that the thermometer indicated a temperature equal to 71° Fahr. An African traveller mentions that on the Senegal one could not expose oneself in the open air after sunset to a slight lowering of temperature without feeling the sensation of decided cold. In central Africa, within ten degrees of the equator, the natives keep themselves warm at night by spreading the mats that form their bedding on hollow clay benches heated by fires or glowing charcoal inside, just as is done in China.

43. In the **temperate zones** not only is the temperature on the whole lower than within the tropics, but the variations in temperature are generally greater. As far as the more productive parts of the earth are concerned, it is chiefly in the temperate zones that **frosts** occur, and water-vapour is precipitated as **snow**. A snow-covering of longer

or shorter duration is a regular annual occurrence in higher latitudes (from about 40° or 46° N. according to the locality), except in those western tracts which are most directly exposed to the warm winds from the south-west. The deepest snows in cultivated regions are those which occur in the eastern provinces of the Canadian Dominion, where snow lies on the ground to a depth of from three to five feet (858). Both snow and frost may be regarded, on the one hand, as interruptions to field labour. Frost is also an interruption to communication by closing navigable rivers, and snow by blocking railways. On the other hand, snow favours timber transport and sledge-travelling. Both snow and frost, moreover, must be recognised as beneficial to the soil, and hence favourable to cultivation. Snow, from being a bad conductor of heat, though it tends to preserve rigorous temperatures in the air above, protects the underlying soil against these rigours, and, when the time of melting arrives, saturates the ground with moisture, which brings vegetation rapidly forward. Frost, again, by expanding the water in freezing in every pore of the soil to which it reaches, pulverises the soil to an extreme degree of fineness, and thus enables the coming vegetation to send its rootlets to a great depth, and obtain in consequence all the greater nourishment.

44. With regard to the effect that the climate of the temperate zone has upon production indirectly through its influence on man as the producer, it may be said, in general terms, that such influence is the opposite of that exercised by the torrid zone. While not so productive as to make little demand for the labour of man, that zone yields enough in return for labour to serve as a stimulus to exertion, and the change of the seasons, and especially the regular recurrence of winter, braces the nerves and tends to make labour agreeable. Different parts of the temperate zone have their compensations. The warmer regions, though, with equal advantages in other respects, more productive than the colder, are less stimulating. Even the coldest regions of the temperate zone in which cultivation is possible at all are more favourable to health and activity than the countries belonging to the tropics, and are far from being so unpleasant in experience as one is apt to represent them in the imagination. For these regions are not only the coldest, but in winter the driest in the world. The winter air in central and eastern Siberia is drier than the air of the driest desert, and with such dryness of the atmosphere fur clothing and a thin tent for a roof are all that is necessary to enable one to pass the night in comfort, even when the temperature is one at which mercury can be chopped into pieces and hammered like iron, at which iron axes are readily shattered like glass, and at which green wood becomes as hard as iron. Lung diseases in such a climate are unknown. Similar accounts are given of the healthiness and comparative pleasantness of the Canadian North-West.

45. SOIL. In the production of vegetable commodities, the nature

of the soil is a circumstance possessing a high degree of importance. The influence which the soil exercises on vegetation is of various kinds. In the first place, the soil supplies a portion of the food of plants. It supplies also substances which may not be themselves converted to any great extent into vegetable tissue, but which serve to carry about the food-stuffs from one part of the plant to another, or to effect the necessary changes on these food-stuffs, from whatever source they may be derived. And, thirdly, the nature of the soil affects the life of the plant by the effect it has upon the temperature of the roots, or other parts of the plant embedded in the ground; for some soils are more readily heated than others, and more readily give up their heat to bodies in contact with them.

46. Soils differ from one another in two classes of characters, physical and chemical, both of which are of importance to the vegetation belonging to them. **Physically, soils differ from one another** in the condition of their particles. They may be coarse or fine, porous or compact and tenacious. Other things being equal, the fine soils are more fertile—that is, supply food more plentifully to the vegetation living upon them—than the coarse; for all the food which plants derive from the soil enters the small rootlets dissolved in moisture, and the finer the earthy particles the more easily are the necessary substances dissolved. This is one reason why the **soil of deltas** is almost invariably remarkable for its fertility, for such soils are made up of the finer sediment carried along by a river. The advantages or disadvantages of **porous soils** as compared with those which are compact and tenacious vary according to circumstances. One advantage porous soils nearly always have—that of being light and easily worked by the plough or spade. They are also easily permeated by water, and thus readily permit rain to sink into them, instead of running in great part off the surface, and at the same time favour the rise of moisture from great depths, by the action of capillarity (the action by which liquid diffuses itself through a lump of sugar). But this may be an advantage for certain plants or in certain climates, and a disadvantage for other plants and in other climates. It is a disadvantage to plants that require the retention of a great deal of moisture about their roots; and while it may be, and generally is, an advantage in climates in which showers are frequent and the atmosphere moist during the growing season, it is a disadvantage in climates of an opposite character, where it is of importance for the plant life that the moisture in the soil should be long retained within reach of the roots—that is, that it should neither sink away to a great depth, nor rise up too rapidly and quickly evaporate, thus giving the plants the benefit of the moisture for only a short time.

In moist climates porous soils are generally, in virtue of the superior dryness of their superficial layers, more easily warmed than heavy and compact soils, and that not only because water requires a greater amount of heat to raise its temperature to a certain degree than any

solid substance, but because of the loss of heat by evaporation (p. 18, *n.*). Hence light porous soils are generally described as dry and warm, and those of the opposite kind, like clays, as wet and cold.

47. Under the head of chemical composition, the differences chiefly considered as characterising different soils are those in the proportion of the substances made use of by plants as food. So great are the natural differences in this respect in different parts of the world, that, to take wheat as an illustration, the soil of one region may yield a crop of 50 or even 70 bushels to the acre, whereas that of another yields, with a climate equally favourable, no more than 12 or 15 bushels, or perhaps even less.

48. The composition of the soil often varies very greatly from local causes within limited areas; but there are, on the other hand, many wide regions noted for being covered with a soil either characteristically rich or characteristically poor; and it will be well to refer to some of the more important of such cases. Everywhere, it ought to be mentioned, the soil is due to the crumbling away of solid rock more or less modified by the vegetable, and even the animal, life that comes to occupy it, and, when large tracts are occupied by a soil of similar character throughout, it is due to the fact that the rocks that contributed to the formation of the soil were spread over a wide region. Hence large deltas are generally remarkable for their fertility, not only, as above indicated, in consequence of their physical nature, but also because they contain ingredients derived from the whole basin of the river by which they are formed, and hence are likely to contain all the constituents which a variety of plants require as food. For a similar reason, great alluvial plains like those of the Ganges and the Po are generally remarkable for their fertility, and so also are those regions which are to be looked upon as the dried-up beds of former lakes, such, for example, as the basin of the Red River (875), which forms a celebrated wheat-growing region in the United States (Minnesota and Dakota) and the Canadian province of Manitoba.

49. Vegetable mould, the product of decay of vegetable matter, mixed with earthy (mineral) constituents, forms a soil of great fertility. The existence of conditions favourable to its formation is therefore a matter of great importance. In some places it is formed very abundantly in tropical forests, where vegetation is continuous, and the accumulation of vegetable waste proportionately rapid. But it is not readily formed in all tropical forests. If the climate be dry, and the forests rather open, the falling leaves dry up, get hard and crisp, and are easily broken by the wind, so that their elements are dispersed in the form of gases. To this cause is ascribed, in a great measure, the infertility of a large part of Brazil (923), and no doubt the same circumstance accounts for the unproductiveness of a large part of Africa (828). In regions where there is a regular winter accumulation of snow, this covering has, among other important effects, that of

burying the fallen vegetable matter and saturating it with moisture so as to favour the formation of vegetable mould. The action of earthworms in promoting the formation of a soil rich in this ingredient, by covering the surface deposits with layers of earth brought up from beneath, has been made a matter of almost universal knowledge by the well-known work of Darwin.[1]

50. Many lavas or rocks originally poured out from the interior of the earth in a liquid state **decompose into a soil of exceeding richness.** Soils of this kind form some of the most fertile tracts, not only in Java and Japan, Campania and eastern Sicily, and other regions where there are volcanoes still active, but in many other regions where there have been no volcanoes within historic times. Among the latter are soils covering considerable areas in Hungary, and the much more extensive tract which forms a large part of the wheat-growing area of Oregon and Washington in the United States, the tract occupying both sides of the Columbia River, where the soil results from the decomposition of a broad basaltic plateau. In some cases, however, so rapid is the decomposition of lava, that some of the vineyards on the slopes of Mount Vesuvius occupy lava fields which came into existence within the nineteenth century.

51. Among other soils noted for their fertility occupying extensive areas in different parts of the world may be mentioned the black soil of southern Russia (**629**) and central Asia (**706**), the yellow soil of northern China (**764**), and the black soil of the Indian plateau, which last differs from all the others previously mentioned in being exceedingly stiff and heavy, and owes a large part of its fertility to its being so peculiarly suited to the character of the climate where it is found (**247**).

52. The soils known as **laterites**, from being of a red colour like the dust derived from pounding red bricks (Lat. *later*, a brick), are characteristic of tropical and sub-tropical climates, being due to the extremely rapid decomposition of the rocks under the influence of rapid changes in temperature, and excessive, though, it may be, only occasional, rainfall. They owe their red colour to the presence of iron, and neither in this respect nor in respect of their chemical composition otherwise do they differ materially from soils found in more temperate regions. What chiefly distinguishes them is their **highly porous**

[1] It is singular that the anticipation of Darwin's observation in a book so popular as Gilbert White's *Natural History of Selborne* should, apparently, be so little known, and that Darwin himself should have forgotten White's remark. The passage referred to occurs in Let. LXXVII (to the Hon. Daines Barrington), where we read:—'Earthworms, though in appearance a small and despicable link in the chain of Nature, yet, if lost, would make a lamentable chasm. For . . . worms seem to be the great promoters of vegetation . . . by boring, perforating, and loosening the soil, and rendering it pervious to rains and the fibres of plants, by drawing straws and stalks of leaves into it; and, most of all, by throwing up such infinite numbers of lumps of earth, called worm-casts, which, being their excrement, is a fine manure for grain and grass.'

character, and the great depth to which they frequently cover the surface. They are found over a large part of the interior of Africa, in India, and some of the islands of the Eastern Archipelago, and in Brazil, and in general they are far from fertile; not in consequence of any deficiency in the ingredients necessary to plant life, but because their physical character causes them rapidly to dry up when not refreshed by incessant showers. In certain situations, and for certain plants, however (as for the coffee-tree in Brazil, on the hills directly exposed to the Atlantic trade-wind), this kind of soil is a peculiarly favourable one.

53. In the arid or drier parts of the earth the soil is frequently highly infertile, and even poisonous to vegetation, from the excess of salts found on the surface, due to the fact that the moisture which does penetrate beneath the ground dissolves the salts in the earth, and then, rising up again and evaporating, leaves the salts as an incrustation behind. Vast areas of this description are found in the interior of Asia and south-eastern Europe, of Australia and South America, while smaller tracts of the same nature exist here and there as patches amidst the fertile regions of California and the Canadian North-West, where they are known as 'alkali spots.'

54. **PRESERVATION OF THE PROPERTIES OF THE SOIL.** But, however rich a soil may be by nature, sooner or later its fertility will be impaired by cultivation unless means are taken to prevent this deterioration. The substances that serve as the food of one crop are removed when that crop is carried away and consumed elsewhere, and as the same kind of plant always requires the same kind of food, the fertility of a soil is in general reduced very rapidly when the same crop is grown repeatedly on the same land, and when nothing is done to restore the ingredients that are thus removed. Under a careful system of cultivation two plans are adopted to counteract this tendency of the soil to lose its fertility. One is to vary the crops that are cultivated in succession on the same piece of ground, which spares the land in three ways. First, since different plants withdraw from the soil different substances as food, or at least varying proportions of the same substances, a crop requiring chiefly one kind of food is made to follow a crop which requires chiefly another kind. Secondly, it is not always necessary to remove from the ground the whole of the cultivated plant, and the parts of the plant not required may be returned to the ground, and help to restore to it some of the ingredients required not only by this crop but by crops of other kinds. But the third effect is, perhaps, the most important of all. It has long been known that leguminous crops, such as clover, have a peculiar value in a rotation of crops, and it has recently been ascertained that this is due to the fact that fungi on the roots of such crops serve as a means of taking nitrogen from the atmosphere to form fertilising nitrates (56) in the soil.

55. Obviously, however, this method is an imperfect one, and the only way to maintain permanently the fertility of the soil is to restore to it in the form of manure the ingredients that are withdrawn by successive crops. But here it must be noted that the quantity of matter that has thus to be returned to the ground is small in comparison with that which is carried away as produce of the soil, even though the plant-food contained in the manure is generally a small proportion of the bulk of the manure itself. It has been found by experiments made in England in the cultivation of wheat that the use of 200 lbs. of a particular kind of manure made a difference of nearly 600 lbs. in the weight of grain yielded by an acre of land, as compared with a piece of land, of the same extent and the same natural qualities of soil, that had borne wheat without manure nine times in succession; and this difference, it will be observed, does not take into account the weight of straw and other parts of the crop. The reason of this is, that though all plants derive some of their nourishment from the soil, and the amount of their produce is generally more or less governed by the amount of nourishment obtainable from that source, yet in all cases the chief constituents of plant-food are derived either from air or water.

56. Small as the total proportion of plant-food derived from the soil is, the constituents of such food are very varied; but **the three essentials to plant-growth most likely to be lacking in cultivated soils are nitrogen, phosphoric acid, and potash,** and hence manures containing these substances are most important as articles of commerce. All three are contained in animal excrements and in animal refuse of various kinds, and these, accordingly, are generally the most convenient manures to apply to the ground, where mixed farming, part crop-growing and part cattle-feeding, is carried on. The advantage of obtaining supplies of manure is, indeed, one of the chief reasons why such mixed farming is so generally practised. The name of commercial manures or commercial fertilisers is given to various compounds, artificially prepared, containing the above-mentioned ingredients along with others, as well as to natural compounds which are found in deposits of greater or less abundance in various parts of the earth, and are worked as minerals, though originally they may be to a large extent of vegetable or animal origin. In such deposits nitrogen is present as a constituent of salts called by chemists **nitrates**,[1] phosphoric acids in salts known as **phosphates**, and potash in the form of **potassic salts (423.11)**. The bones of animals, being to a large extent composed of phosphate of lime, are of great value as manure, and that, it should be mentioned, not only on account of the phosphoric acid

[1] In view of the rapid consumption of Chilean nitrate of soda, which, if its consumption continues to increase at the present rate, will, it is estimated, be exhausted by the year 1940, it is extremely important that it has recently become practicable to manufacture nitrogenous manures by fixing the nitrogen of the air. See Dr. A. Frank, *Ersatz des Chilisalpeters in der Zukunft—Kalkstickstoff*, a paper read before the Eighth International Agricultural Congress (Vienna, 1907), a few particulars from which are given in *Scot. Geog. Mag.*, 1908, pp. 181–2.

which they contain, but also on account of the lime itself; for though this latter substance is not so important as phosphoric acid as a plant-food, it is often of the highest importance as a manure from the fact that, by bringing about certain chemical changes, it helps to make the constituents of plant-food which are present in the soil available to the vegetation. For, seeing that, as already stated, all the elements which a plant derives from the soil enter the rootlets in a state of solution, no element of plant-food is of any use to the plant unless it be first dissolved; and among other uses which lime has as a fertiliser this is one of the most important, that it is one of the best materials that can be employed for the sake of imparting solubility to substances otherwise insoluble. (See **243**, **247**.)

57. Notwithstanding the manifest advantages of **the adequate use of manure** in maintaining the value of the soil, its employment in sufficient quantity to ensure the preservation of a high degree of fertility is far **from being general. Manure is, as a rule, but little used, first, where the population is sparse, and, secondly, where the population is poor.** The United States and India may serve to illustrate these two cases. Where the population is sparse land is cheap, and the cultivator may find, and usually does find, it more profitable, at least for the present, to derive as large crops as he can from the ground without manure, and begin to cultivate new ground when the first shows signs of being exhausted. Moreover, where the population is scanty, there are for obvious reasons fewer opportunities of obtaining animal manure, which in regions possessing a dense population is the kind most readily available. In the United States, accordingly, what we find is that the use of manure has gradually spread westwards, following in the wake of cultivation. The eastern states, which were those first cultivated, were in the beginning cultivated without manure and as these lands became partly exhausted, others further west became the chief regions of agricultural production; but at the same time, as the population, from the development of commerce and industry, thickened in the eastern states, the use of manure to restore fertility to the fields of that region became more and more general. About 1883 the use of manure was stated to have reached the longitude of Ohio, and to be beginning in Indiana, and even in Illinois.[1]

58. In India, again, though the population is dense, manure is probably even less used than in the United States; but the principal reason of this is that the employment of manure, besides always involving a certain amount of expense, does not yield its full benefit in the way of increased produce in one or two crops. However necessary it may be, therefore, to maintain the fertility of the land, it cannot be resorted to where the cultivators are too poor, as most of those of India are, to be

[1] Even at the close of the nineteenth century it was stated by Mr. B. W. Snow, in an article in the *Forum* (vol. xxviii. p. 101), that not one acre in fifty is directly fertilised for wheat in the United States.

able to wait and look forward to future years for the reward of an outlay on their farms. 'In many districts [of India] the pastures have been brought under the plough, to the detriment of the cattle. The people can no longer afford to leave sufficient land fallow, or under grass, for their oxen and cows.' (Hunter's 'Gazetteer,' vi. 49.) They are obliged by necessity to content themselves with the small and diminishing returns of unmanured ground. It is the great prerogative of man 'to look before and after'; and in agriculture, as in other pursuits, the condition of continued prosperity is to provide in the present for the wants of a somewhat distant future; and, while increasing wealth will probably result from the exercise of this foresight, the penalty of inability to do this is almost sure to be increasing poverty.

59. In any case, the cultivation of the soil, without taking means to restore the fertility which continued cropping more or less impairs, is a mode of procedure that can only be of temporary advantage to any country, and cannot be of advantage at all unless it leads to the accumulation of wealth, which will render possible the restoration of fertility to the soil when exhaustive cultivation can no longer be pursued. Cultivation on the system originally practised in America, involving the use of a greater and greater extent of land to increase the production, is known as **extensive cultivation**, as opposed to the system of **intensive cultivation**, which consists in putting more into the land to get more out of it; and the furtherance of the latter system—that is, the increasing use of manure—is always a sign of advancing agriculture and industry in general. The great productiveness of wheat in England (**141**) is due to the practice of this system.

60. IRRIGATION. As manure is the means of correcting deficiencies in the soil, whether these be original or the result of exhaustion, so **irrigation** is the means of remedying one of the great defects of climate in many regions, the deficiency of rain. The ease with which this remedy can be applied varies greatly according to circumstances. Nowhere is it easier than on the land adjoining those rivers which regularly overflow their banks, like the Nile, the Tigris and Euphrates, or the Ganges. In such cases, all that is necessary is to provide canals and sluices by means of which the flow of the water over the surface of the land may be to some extent regulated; and it is likewise a fact of the highest importance that the irrigation of land so situated is not only exceptionally easy, but also of exceptional value. For a river when highest in flood is always most highly charged with fertilising sediment; and so rich is this in the valley of the Nile, for example, that wherever 'red water' can be supplied there is no need for manure (**797–798**). In the Ganges valley, again, 'embankments are in few places required to restrain its inundations, for the alluvial silt which it spills over its banks year by year affords to the fields a top-dressing of inexhaustible fertility. If one crop be drowned by the flood, the cultivator calculates that his second crop will abundantly requite him.'

61. In other cases, various more or less costly methods have to be employed to render water available. Water may be raised by buckets from wells or rivers. Large tanks may be constructed to store the superfluous waters of one season or period against the deficiencies of another. Great canals may be fed from the higher parts of a river-course, and employed to convey the river-water to the tracts lower down.

62. In some places the structure of the country is such that when holes are dug in the ground to a certain depth water rises freely to the surface often with great force. Wells so made are called **artesian wells.** Such wells have been sunk in many regions where the rainfall is deficient. Great hopes are entertained that by this means large areas hitherto wholly or nearly barren may be brought into cultivation, or be made more richly productive. But it has always to be borne in mind that such wells bring to the surface only a small portion of the water that falls upon a given area in the form of rain, and that it is hence impossible in this way to render the whole of any region characterised by a markedly deficient rainfall fit for agriculture. On the other hand, the water brought to the surface by means of an artesian well, or by any other means, can be much more profitably used in agriculture than an equal quantity of rain. It can be preserved in artificial tanks till the exact period at which it is needed. It is thus kept from sinking into the ground to a great depth, and so becoming lost to vegetation, as happens to much of the rain that falls upon the earth where the soil is highly porous. At the same time it suffers infinitely less loss than generally diffused moisture through evaporation—a matter of peculiar importance in those bright and warm regions where irrigation is specially required. For crops of great value it is even sometimes found of advantage to distribute the water to the fields entirely by underground pipes. By the adoption of this method evaporation is almost wholly prevented. Moreover, irrigation water recovered from underground is always more or less impregnated with dissolved earthy matters, which may, indeed, in some cases be injurious to vegetation, but more commonly serve to increase the fertility.

63. It will thus be seen that though irrigation is almost always a costly process, the **advantages** derived from it are correspondingly great. They are chiefly these. (1) The supply of water by irrigation is more certain and regular than that by rain even in regions where the rainfall is generally plentiful, and that of itself increases the productiveness of irrigated crops. (2) Irrigation water is generally more or less rich in fertilising ingredients according to circumstances. In India it is found that as a general rule irrigation doubles the weight of crops off the same land. (3) Irrigation by flooding is sometimes of service in washing away noxious constituents from the soil. (4) Irrigation often enables valuable crops to be grown in place of inferior ones. (5) It renders cultivation possible in some cases during the whole period of

the year for which the temperature is sufficient in the irrigated region. 'Thus in the southern part of California, as well as in Western Arizona, crops may be started at whatever season suits the convenience of the grower, except two months in the year, and this holds true for market-gardens as far north as San Francisco. In Tulare and Kern counties [35°–37° N.] five cuts of alfalfa [lucerne—**472**] have been taken off the same field in a single season.'[1] In Algeria three crops of potatoes may be grown in succession in one season on irrigated land. Hence it naturally follows that the density of population in irrigated regions often reaches a very high point, even when the bulk of the population depends upon agriculture. In the irrigated portion of the Spanish province of Murcia, for example, the density is nearly 1700 to the square mile, as compared with 85 per square mile for the average of Spain generally. (See also **670**.)

64. It is one of the chief advantages of **terrace cultivation**—that is, the cutting of hill slopes into terraced fields rising step-like above one another—that fields so made are irrigated with great facility. This mode of laying out fields is hence largely practised in the warmer parts of the world, and in some cases a marvellous amount of labour is expended on their original formation. Describing the ascent from Hodeida to Sana in **Yemen** (716), Major-General Haig writes as follows: 'The whole mountain side, for a height of 6,000 feet, was terraced from top to bottom. The crops had all been removed; only some lines of coffee-trees here and there were to be seen, but everywhere, above, below, and all around, these endless flights of terrace walls met the eye. One can hardly conceive the enormous amount of labour, toil, and perseverance which these represent. The terrace walls are usually from five to eight feet in height, but towards the top of the mountain they are much higher, being sometimes as much as fifteen and eighteen feet. They are built entirely of rough stone laid without mortar. I reckoned on an average that each wall retains a terrace not more than twice its own height in width. So steep, in fact, is the mountain, that the zigzag continues almost the whole way to the top.'[2]

65. LABOUR. The differences in the quality of human labour and the condition of the labourers have almost if not quite as much influence on the nature and quantity of the products of industry as the diversities of soil and climate. Human labour may be broadly divided into **slave, or forced, and free** labour, the latter being that which is now almost universally employed in the production of commercial commodities.

66. There are, however, **great diversities in the condition even of free labourers** in different parts of the world. A table in the Appendix gives examples of these diversities from one point of view, namely, that of money wages; and it will be observed that the **highest wages** are those paid **in new countries**, like the United

[1] *U.S. Census Report* (1880), vi. p. 16, of section on California.
[2] *Proc. R.G.S.*, 1887, p. 482.

States and British North America, the Australian colonies, Uruguay, and the Argentine Republic, in which the natural resources of the countries are very imperfectly developed but are being rapidly utilised, or, in other words, where land, inherently valuable from the nature of the soil and climate, is still cheap from the sparseness of the population, but is in process of becoming dearer through the more or less rapid increase of the population. The **lowest wages,** again, are paid **in tropical countries,** and in particular in those regions **in which there is an exceedingly dense population** dependent mainly on agriculture. In the district of Lucknow, for example, a district in India in which the population seems to have become as dense as it can be, seeing that it is now almost stationary, the rate of wages of ordinary agricultural labourers is only from one-twelfth to one-eighth of the rate for unskilled labour in Lower Burma, which, considering its natural advantages of soil and climate, has a smaller population than any other part of British India, and where accordingly the population has under British rule (747) been rapidly increasing.

67. But the difference in the money wage of labour is far from representing the difference either in the cost of the labour to the employer or the condition of the labourer himself. **The highest-paid labour is as a rule also the most efficient,** that is, able to produce a greater result within a given time. 'At the Fama Mill at Tlalpam [Mexico] weavers [in cotton mills] cannot be got to run more than two looms each, whereas, at the Fall River Factory, in Massachusetts, a good weaver will run six or eight looms. The boys at Tlalpam can manage only 450 spindles each, but at Fall River a quick girl will see to 700.'[1] In 1885 there were for every 100 persons employed in cotton factories in the United Kingdom 8,798 spindles and 111 power-looms; whereas in India, in 1882–83, for the same number of persons employed, there were only 3,085 spindles and 28 power-looms.[2]

The reason of this difference of efficiency is to be found in various causes. Much is undoubtedly due to difference of race and climate, but much also to difference in food and dwellings and to difference in intelligence, the highest-paid labourers being those who can afford to live in the best houses and eat the most nourishing food.

68. But, as has just been stated, the condition of the labourer also is very inadequately indicated by the difference in the rate of wages, since the wants of the labourer are very greatly affected by different circumstances, and above all by climate. In a region where the winters are severe, the labourer has to spend more in providing himself with adequate protection against the weather by means of good housing, clothing, and fuel than he has to do in a region where the climate is less severe, without being better off in health and comfort

[1] *Report by Consul Jenner*, Mexico, May 26, 1886.

[2] In 1890 the corresponding figures for the United Kingdom were 8,416 spindles and 112 power-looms, in 1899–1900 in India 2,902 spindles and 24 power-looms.

than a labourer in the more favoured region. The food required in a temperate climate, and especially one of the colder temperate countries, moreover, is of a much more expensive kind than that suitable to a tropical or warm temperate climate. The account given in a previous paragraph (40*a*) of the mode of life of an inhabitant of a country district in Colombia, will serve to give an idea of the requirements of labourers in other parts of the tropics also; but even in Japan, which lies in the same latitude as the east of the Mediterranean, and has a much severer climate, the farm labourers live almost entirely on rice, barley, or wheat, beans, pease, and other vegetable food, in summer wear little more clothing than 'that which nature sent them into the world with,' and in winter a cotton garment or two, with straw sandals and wooden clogs. The whole clothing of a year does not cost him more than sixteen or twenty shillings. It is worthy of being pointed out, however, that those parts of the world in which the highest wages of all are paid are also those in which many of the most important necessaries of life are cheap. Cheap land ensures relatively cheap food, which more than makes up for the dearness of manufactured articles to the working-man; and the advantage of high wages is still further increased if fuel also happens to be cheap (which depends upon circumstances), or if the climate is characterised by little severe weather, as in the Australasian colonies.

69. **Even free labour is subject to many restrictions** imposed by custom and religion, by government interference, or by the voluntary organisations of the labourers. In all Christian countries custom and religion have established the Sunday as a day of rest; and though this abstention from ordinary labours on Sunday is probably nowhere rigorously adhered to, it is more generally observed in the British Isles and the countries of British origin than elsewhere. In Roman Catholic countries, and the countries belonging to the Greek Church, the days devoted to religious festivals take a more prominent place in interrupting the ordinary course of labour than they do in Protestant countries. In Mohammedan countries Friday (even in pre-Mohammedan times a day of rest in Arabia) is specially devoted to religious services, but it is less rigorously observed as a day of rest than the Sunday in Christian lands.

70. The **interference of government** with the employment of labour in free countries is in some cases in the form of enactments limiting the number of hours of work to be exacted in a day; in other cases in other modes. The **Factory Acts** in the United Kingdom professedly limit the working-hours in factories only for women and children; but as almost all factories can be worked only when such labour as well as that of men is available, they have the effect of limiting the number of hours' work in such establishments absolutely. The provisions in those Acts that expressly apply to adult male workers are only such as are intended to secure health and safety. The Factory Act of 1901

regulates the hours in different industries for children (persons between the ages of twelve and fourteen), young persons (those from the age of fourteen, or, if they have the requisite educational certificate, from thirteen to eighteen), and women; and the Elementary Education Act of 1899 prohibits any such employment of a child under twelve as would prevent full-time attendance at school. The Employers' Liability Act of 1897 renders employers liable in certain cases for injuries sustained by persons in their employment, whether there may have been any contributory negligence on the part of the injured or not, and in 1900 another Act extended this liability in certain cases to agricultural employers. There is similar legislation in many European countries. In Switzerland the limitation of hours expressly applies to men as well as women, and in Germany the Imperial Industrial Code empowers the Imperial Government to limit the hours for men and women alike where excessive hours are deemed to be injurious to health. In that empire, also, an Act of 1883 provides for the insurance of workmen against illness, one of 1884 against accidents, and one of 1889 provides for old-age pensions (beginning at the age of seventy). In the United States there is an Act limiting the number of hours in the day's work in all government establishments to eight. Labour legislation generally, however, is in that country a matter reserved to the individual states, and in such legislation Massachusetts has mostly been the pioneer. In the United Kingdom a labour bureau has been organised for the purpose of collecting information as to wages and employment both at home and abroad. In New Zealand and New South Wales the labour legislation includes provisions for compulsory arbitration.

71. **Trade-unions** and similar voluntary organisations among labourers impose various restrictions on the labour of their members for the sake of what is believed to be the general interest of the body, the efforts of these organisations being directed mainly to the obtaining of as high wages and as short working-hours as are possible in any given state of trade and industry. Such organisations are most highly developed in countries, like the United Kingdom and the United States, in which manufacturing industry is most highly advanced; but unions having similar objects have existed at all times in many countries. Among the labourers of **China** trade-guilds exercise important functions of various kinds. Chinese emigrants carry the system with them into the lands to which they emigrate, and in some cases are thus enabled to obtain a better standing for themselves. In **India** the caste-system as now developed acts to some extent in the same way. As a trade-union each caste 'insists on the proper training of the youth of its craft, regulates the wages of its members, deals with trade delinquents, and promotes good-fellowship by social gatherings.' (Hunter's 'Gazetteer,' 2nd ed. vi. 197.)

72. The kind of labour known as **coolie labour** is a form of free

labour, but a peculiar one. The labourers known as coolies are emigrants from India and China who bind themselves to work for a term of years (usually five years) on plantations in European tropical and subtropical colonies. They are entitled to regular wages while their term lasts, and in some cases to a free passage back to their own country when their term has expired. Contracts for the engagement of coolies in India and China are allowed only under certain regulations, and it has sometimes been found necessary, owing to the treatment to which the coolies have been subjected, for the government of the country from which they are derived to prohibit such engagements with certain colonies altogether. Still worse abuses were sometimes connected with the introduction of Polynesian labourers into Australia (950).

73. Somewhat similar **contracts** are made even **with bodies of European labourers**, the chief difference being that in their case the work on which they are engaged is not the tending of plantations, but the execution of some great piece of engineering. At the present time it is Italian labourers that are principally so employed. In central Europe, 'these labourers are "supplied" to any number by contract agents in Vienna, and they arrive on the ground with something like the mobility and precision of regular troops.' They were even introduced into the United States, and were very largely employed there in the construction of railways; but their further introduction was prohibited by an Act of Congress in February 1885, which made the importation and migration of foreigners and aliens under contract illegal.[1]

74. **Slave labour** in the strict sense of the term is now almost confined to the tropics, and Africa is the only part of the world where slavery still flourishes. At one time or another, however, slavery has been practised in all countries, and even in Europe down to the nineteenth century. It is only within the last fifty or sixty years that the system was put an end to in the tropical colonies of European countries, Great Britain having set the example in 1833 by passing an Act for the emancipation of the slaves throughout the British dominions. So far as the production of commercial commodities was concerned, the immediate effect of the abolition of slavery was in many cases disastrous. The freed negroes (for people of African origin formed the slaves in all parts of America) preferred, wherever plenty of land could be had, to live the life described in par. **40*a***, instead of working for wages, however high, on plantations. The consequence was that in Jamaica, for example, the annual value of the exports fell from an average of nearly three millions sterling during the period 1832–36 to less than

[1] They were largely employed by the Russians in laying their railways in the remotest parts of Asia. A correspondent of *The Times* found 200 Italians among the workmen in an out-of-the-way railway settlement in the Khingan Mountains in Manchuria in 1902.

two millions in the period 1842–46. In densely-peopled islands like Barbados, where the negroes when liberated were obliged to work in order to gain a living, the effect was not so bad. In other parts of America in which slavery has been abolished subsequently, the effects have varied similarly according to circumstances, being little marked in respect of the quantity of production, at least where there were facilities for replacing slave by free labour, and especially by the labour of white men. In parts of Brazil, for instance, the change from slave to free labour was eagerly welcomed by the entire body of the inhabitants, inasmuch as the work was done 'better, quicker, and with more care' by free men than by slaves, so that the benefit of emancipation was at once realised.

75. There are other forms of forced labour besides that maintained by the system of slavery. The system of **serfage**, according to which individuals with separate rights and separate property were yet attached to particular estates for the owners of which they were compelled to work, and were usually sold with the estates, subsisted in Russia till 1861; and forced labour for certain purposes was up till recently exacted by the Dutch government in the East Indies (757), and by the government of Egypt (797).

76. **MACHINERY.** The nature of the change that has been made in the conditions of production in manufacturing industry through the introduction of machinery is sufficiently illustrated in pars. 254–56, where some account of the influence of modern machinery in the cotton manufactures is given. Here it will be enough to call attention to the fact that the changes due to this cause have all come about within little more than a hundred years, and that this applies even to the most important agricultural implements made of iron, which, along with agricultural machinery properly so called, have during the same period effected a parallel revolution in the condition of agriculture. The cast-iron ploughshare is an invention little more than a hundred years old (it was patented in England by Messrs. Ransome of Ipswich in 1785); and it was after the beginning of the nineteenth century that the cast-iron plough came into general use in America. Where fuel is abundant steam is now the prevailing means of driving machinery; but before steam came into use **wind-power** (chiefly in level countries) and **water-power** (chiefly in mountainous and hilly regions) were largely employed, and water-power is now indeed rapidly growing in importance.[1] Even **solar heat** is used as a source of power where the sunshine is sufficiently constant.[2]

77. **DEVASTATING AGENTS.** In the previous paragraphs we have been considering the various factors that contribute to the production of commodities; but it is important to bear in mind that

[1] See Introduction to Fourth Edition, par. 44.
[2] As in southern California. See *For. Off. Report, Annual Ser.* No. 2825, p. 30.

commerce and industry are greatly affected by destroying agents of various kinds. These may be classed under two heads—physical destroying agents, the most important of which are directly or indirectly due to climatic conditions; and destructive forms of life, whether vegetable or animal.

78. Among the physical destroying agents we may mention first, **frost**, from which most tropical and sub-tropical plants, such as coffee, tobacco (**262**), cotton (**241**), &c., suffer greatly when they happen to be exposed to it.

79. In certain regions, and especially in those which have a climate at once warm and arid, **hail** is often much more destructive than we could form any idea of from the character of the hailstones which usually fall in England. In such regions the hailstones are sometimes as big as eggs. In the summer of 1883 a hailstorm in the government of Tomsk, in western Siberia, was reported to have been attended by the fall of stones which killed both animals and human beings; and in the same summer a still more destructive hailstorm was reported from Iowa, U.S. Its track was four miles wide. 'All vegetation was destroyed in its course. One woman lost her life, and many persons were injured. Twenty-two cattle were killed. The hail fell in some places to a depth of five feet.'[1] At the Colonial and Indian Exhibition held in London in 1886, a corrugated iron roof perforated with large holes made by hailstones was among the articles exhibited in the section devoted to the Cape Colony.

80. To certain crops, and especially those which depend greatly on the amount of blossom that comes to maturity, like fruit-trees, cotton, coffee, &c., great damage is often caused by unseasonable **winds**; but more destructive on a large scale than any of the agents yet named is **drought.** The regions liable to suffer most heavily from this cause are those which lie on the border-line between regions in which an abundant, or at least sufficient, rainfall can always be depended on, and those in which the rainfall is too scanty to admit of settlement without irrigation, but in which the rainfall, though sufficient in most years, is apt from time to time to fail. In the densely peopled regions of India and China that are so situated, the failure of rain has often caused the loss of millions of human lives; but in the less populous regions in the interior of North and South America, and in Australia, the destruction caused thereby is confined to sheep and cattle and other kinds of livestock. Between 1883 and 1884 the number of sheep in New South Wales declined from about 34·4 to about 30·4 millions, mainly from this cause, directly or indirectly—that is, either by the death of the animals, or their sale to other colonies less affected by drought in that year.[2]

[1] *Nature*, vol. xxviii. p. 376.

[2] From the same cause the number of sheep in New South Wales declined from 61·8 millions in 1891 to 36·2 millions in 1899, in Queensland from 21·7 millions in 1892 to 10·0 millions in 1901.

81. Great destruction is sometimes wrought by **inundations** on the banks of great rivers like the Hwang-Ho, Mississippi, and the Ganges, or even like the Danube and some of its more important tributaries (**624**), and on low-lying lands in the neighbourhood of the sea. Stupendous embankments have been constructed along the Ganges in Lower Bengal to guard against this danger, but these restrain 'without altogether preventing' the excesses of the inundations; and the same may be said regarding the similar works that have been executed in the United States and the Hungarian plains, on the banks of the rivers above named. Among the more memorable excesses of the sea may be mentioned that by which the greater part of the present Zuider Zee was submerged (thirteenth century), and that by which an area of about 3,000 square miles at the head of the Bay of Bengal was overwhelmed, and many thousands of people lost their lives, during a cyclone in November 1876.

82. **Volcanic outbursts** and **earthquakes**, though fortunately comparatively rare occurrences in their more awful forms, may also be mentioned as physical agents which occasionally produce widespread destruction.

83. The **living destructive agents** are probably on the whole more injurious than any of the physical agents above mentioned, inasmuch as many of them are extremely persistent, being very difficult to extirpate, and renewing their attacks on particular crops or on various forms of vegetation year after year. The mere enumeration of such destroyers would fill a volume, and whole volumes have been devoted to accounts of individual pests of this kind, and here accordingly we can only allude to a few of the more important.

83*a*. The **vegetable pests** consist mainly of minute **fungi** which settle upon various parts of a plant and indicate their presence by the discoloration they produce. Such, for example, are the fungi which produce the disease known as rust in cereals, that known as mildew on the vine (**182**) and on many other plants, subject to attack each from its own fungus, and the fungus (*Hemileia vastatrix*) which has done much to destroy the cultivation of the coffee-tree in Ceylon (**287**).

83*b*. Of **animal pests**, the most destructive, on the whole, are insects. Among these may be mentioned **locusts**, different species of which infest treeless arid regions in both the Old World and the New, being thus fortunately confined to areas in which there is little cultivation. From time to time, however, they invade cultivated fields, where they arrive flying in thick solid masses, filling the air, darkening the sun, forming an immense unbroken cloud, which may take more than an hour to pass by, and, when they settle, consuming every green thing to be seen, the working of their jaws meanwhile causing a sound which can be heard at a great distance. Equally sweeping in its destruction is the insect known in the United States as the **army-worm**, which is the larva or unwinged stage of a kind of moth, and owes its

name to the fact that on the march the 'worms' all 'keep together like an army of soldiers, and usually advance in a straight line.'[1] Of grass or young grain that comes in their way they eat up every vestige, but when grain has grown enough to form a head, they eat only the leaves, and then climb up the stalk, cut off the head, and drop it to the ground. Among insects destructive to particular objects of cultivation may be mentioned the **Hessian fly** (*Cecidomyia destructor*, Say), which attacks wheat and barley, and has proved peculiarly destructive in various parts of the United States, so as to lead to the abandonment, for a certain time at least, of wheat cultivation in certain districts; the **Colorado beetle**, which wrought great ravages among the potatoes in the United States in many years subsequent to 1861; the **phylloxera**, which for a time put an end to the cultivation of the vine in several departments in France, and greatly reduced it elsewhere (182). To the lower forms of animal life belongs the parasite which produces the silk-worm disease (228). Among destructive animals of a higher type may be mentioned, first, sparrows, which have multiplied so rapidly since they were introduced into Australia, that they have become a regular plague to the farmer. But a still more serious plague, both in Australia and New Zealand, has grown out of the introduction of the **rabbit**, the multiplication of which has in some instances compelled squatters to abandon their sheep-runs, and cultivators their holdings, and has already caused different Australian governments to expend hundreds of thousands of pounds in efforts to extirpate it, or rather to keep it down, since extermination seems impossible. **Rats** have proved equally destructive among the sugar-canes of Jamaica. The mongoose, a small but fierce carnivorous animal somewhat like a ferret, which was introduced into that island with great success to destroy the rats, has since become as great a pest itself through its raids on domestic poultry. In the parts of the Argentine Republic that have a similar climate to the pastoral regions of Australia, the native **vizcacha**, an animal with similar habits to those of the rabbit, is quite as destructive, and has likewise been the object of all sorts of devices to compass its extermination.

The preceding paragraphs have dealt with the production of commercial commodities, and the circumstances that assist and diminish production. In those which now follow we have to consider those circumstances which affect the exchange of commodities between different districts and countries.

84. TRANSPORT. First of all under this head we have to consider the subject of transport. In countries in which the majority of the inhabitants have been familiar from childhood with the most improved means of carriage, it is not easy to realise the difficulties with which commerce has to contend in other parts of the world owing to the want of those facilities which are so familiar to us. To

[1] *Nature*, xxx. 243.

enable one to appreciate the benefits which improved means of conveyance has conferred upon us, it will be worth while to give here some illustration of the primitive and laborious modes of carriage that are still in use elsewhere. These examples will serve at the same time to show the urgent need for commerce that is felt by all human communities, seeing that it is not entirely checked even by such difficulties in the way of transport.

85. In central Africa, in various parts of south-eastern Asia, even in densely peopled districts of such highly civilised countries as China and Japan, the land-carriage of goods still takes place to a large extent by means of **human porters**, or by **vehicles drawn or pushed by men.** Probably the severest labour of this kind undergone in any part of the world is that which is endured by the carriers in the tea-trade between the south-west of China and Tibet. The tea has to be introduced into Tibet across high mountains, and is carried either on mule-back or by porters. A mule goes more than twice as fast as a human porter, but carries only half the load, a man's load being on an average nearly 200 lbs., in some exceptional instances more than 400 lbs. The package is borne on a light wooden frame, which is slung on the back by means of armholes, generally made of coir (319). Laden thus, the porters halt every few hundred yards to recover their strength, resting their burden meanwhile on a short crutch; for if they released it from their shoulders altogether, they would have difficulty in taking it up again. 'Travelling six or seven miles a day, and resting in the inns at night, they toil with their prodigious loads over two mountain passes 7,000 feet above their starting-place, along a rudely paved road, where every step of the way must be picked,' making a distance of 120 miles in twenty days or less, and receiving a sum equal to about 1*s.* 6*d.* or a little more, per day, according to the number of packages carried.[1]

86. **In northern China** human labour in the carriage of goods is sometimes aided by **sails attached to wheelbarrows**, the sails being in many cases so rigged that they may be raised or reefed at pleasure. This arrangement serves to allow of an increase of the load, but does not seem to reduce the demand on human labour. 'We have never seen these wheelbarrows without pity,' says Dr. Williamson in his 'Journeys in Northern China'; 'the strain to the men who manage them is enormous; indeed, we have never witnessed human beings under such heavy labour. We met many with 14 bean-cakes on one barrow, equal to seven small donkey-loads, and often saw six bales of cotton on one barrow, though two are considered sufficient for a mule; but human labour is cheaper than animal.' **In Japan** there are two kinds of cart-carriage, one drawn by men, and one by a bull or cow. Where human labour is employed, there are usually two men in front and two behind. But, writes the Consul-General of the United States,

[1] Baber, *Travels and Researches in the Interior of China*, pp. 194–95.

'I have seen an old man and a young woman, the latter with a small child strapt on her back, pulling a cart-load of wood or coal up steep hills and over sandy plains. Ten to twelve miles a day with a loaded cart is a day's work, and 600 to 700 lbs. an average load for two persons.'[1] For this heavy work a sum equal to from about *5d.* to *10d.* per day is considered good pay.

87. Where the large **domestic animals** are abundant, it is scarcely necessary to say that by their use the call for human labour in transport is greatly reduced. As a beast of burden, in most European countries, and those which derived their civilisation from Europe, by far the most serviceable is the **horse**, but the **ox** is still largely used for the same purposes in central and eastern Europe. In southern Europe, and the region round the Mediterranean generally, the **ass**, which thrives better than the horse on the scanty herbage characteristic of that region, is an animal of much more consequence than in the rest of Europe, and hence is more cared for and of finer aspect and better qualities; and in the mountainous parts of that region, the **mule** is preferred to both on account of its sure-footedness and endurance. These qualities have secured the introduction of the latter animal, which is frequently mentioned in Homer, into all mountainous countries with a moderately warm and dry climate, both in the Old World and the New. **Reindeer- or dog-sledges** are used in winter in the snow-covered regions of northern Asia, Europe, and America.

88. In the most populous parts of Asia and in central Africa various breeds of **oxen** are the principal beasts of burden; and next to these, in Asia, come buffaloes, horses being for the most part neither numerous nor of good quality. In the mountainous parts of central Asia, including the Himalayas, a peculiar species of oxen, known as the **yak**, which is found both wild and domesticated, and is characterised by long fine silky or slightly curly hair hanging down from various parts of its body, is used like the mule in southern Europe. In some parts of the same region goats and sheep are employed for the carriage of light burdens.. The Asiatic **elephant**, which haunts the forests of south-eastern Asia from the south of the Himalayas to the borders of China, and the large tropical islands from Ceylon to Sumatra and Borneo, is invaluable as a beast of burden throughout that region, wherever there are no proper roads; for though, where roads do exist, it does not accomplish so much work in proportion to the food it consumes as either the horse, the ox, or the buffalo, it can make its way across marshes and through forests which could not be traversed by any of the other animals mentioned. Throughout India, the catching of elephants is under government supervision, the chief elephant-catching establishment being in Lower Burma. The African elephant is no longer trained to labour, though it was so by the ancients, and in the north-east of Africa down to the close of the middle ages. (See **831.**)

[1] *Reports on Labour in Foreign Countries*, iii. 333.

89. In deserts and regions remarkable for their drought, the camel is even more indispensable as a beast of burden than the elephant amidst forests and marshes. Provided with one or two humps of fat, which serve as stores of food, its stomach lined with hundreds of little cells or compartments capable of holding water, a camel, when well fed and supplied with water at starting, can accomplish immense journeys on the most meagre fare, and without finding it necessary to drink. In extreme cases it can go thirteen days[1] without water, and frequently it does so for three or four days. By no other animal is so much merchandise carried such long distances. It is the sole means of commerce between the oases of northern Africa, as well as between the north African coast and the fertile territories of the Sudan, and is largely employed in western Asia. It has also been introduced into Australia, where it has been employed in exploring the interior. The camel has been called 'the ship of the desert'; but, however appropriate this appellation may be in many respects, it is important to bear in mind that the load carried by a camel is only equal to that of a very small boat. As a rule the load is from about 330 to 450 lbs.[2]; so that it would require more than 5,000 camels to carry a burden equal to that of a ship of 1,000 tons. As a matter of fact, a camel caravan usually consists of from one to ten thousand camels, the journey across deserts being made in such large companies, not only for the sake of carrying a large quantity and variety of merchandise, but also for the sake of having a sufficiently large body of men to defend the caravan against the robbers by which deserts are usually infested. And robbers are not the only danger to which caravans are exposed. The scorching sandstorms which sometimes occur are equally distressing and perilous. The route, in many places marked by small heaps of stones, is often, when lost, difficult to find. The ship of the desert is, in fact, even more liable to be wrecked than the ship of the sea. Thousands of corpses along the route from Fezzan to Bornu, the shortest of all the routes from the oases of northern Africa to the fertile regions of central Sudan, speak eloquently of the perils of desert navigation.

90. The simplest method of making use of animals for transport is to employ them as beasts of burden, like pack-horses, sumpter-mules, and baggage-camels; but this method is far from being the most efficient. An immense advance is made when animals are employed to draw wheeled carriages. Camels can drag a load about four times as heavy as they can carry, even where there are no roads. For the most part, however, the use of wheeled carriages involves the making of roads; and, notwithstanding the perfection to which this

[1] F. L. James, *The Unknown Horn of Africa*, p. 105.

[2] This is the load of the single-humped camel in use in North Africa and western Asia including Persia, but the ordinary load of the Bactrian or two-humped camel appears to be double that, and in certain cases even more.

art was carried by the Romans, it is a fact rather difficult for us to realise nowadays that it is only within the last hundred years that, on account of the wretched state of the roads, it took two days and three nights' incessant travelling to get from Manchester to Glasgow (Robert Owen in 1795). About fifteen years before that Arthur Young inveighed against the roads as execrable in all parts of England. In Suffolk he describes one with ponds of liquid dirt, and a scattering of loose flints just sufficient to lame every horse that moves near them. In Lancashire he measured ruts four feet deep.[1] Such facts as these help us to appreciate the improvements in road-making introduced about the end of the eighteenth century by **Telford and Macadam.**

91. In considering the facts just referred to, it must, moreover, be borne in mind that England is a country with special advantages for road-making. In the first place, good road-making material is abundant; great marshes have long been drained. It is difficult, therefore, for us to picture to ourselves the condition of countries in which communication is hindered by marshes hundreds of miles in extent, as in western Siberia and in Hungary, or those in which there are still vaster plains destitute both of stones and timber (**725**). Secondly, the physical configuration of England places few difficulties in the way of laying roads in any direction. The importance of this consideration may be perceived to some extent even in the British Isles. A map of Scotland which shows at once the roads and the physical features makes plain to the eye how the surface configuration has governed the direction of the roads, but nothing in the British Isles can give any but a faint idea of the obstacles to communication that arise from this cause elsewhere. Across the Himalayas there is at least one **mountain-pass**, regularly used for trade, upwards of 18,000 feet above sea-level, and deeply buried in snow even at the height of summer. Some of the passes of the tropical Andes exceed the height of 15,000 feet, and the principal pass across the Chilean Andes, in about 33° S., attains a height of between 12,000 and 13,000 feet (**930*a***). In the mountainous region separating the north-west of India from Russian Central Asia, some of the roads lead through narrow rocky gorges, in which passage is afforded by balconies supported on timbers let into the face of the rock, some of these balconies being so long that they oscillate threateningly under the feet of the passer-by. On such routes also robbers are apt to abound (**721**).

92. The advantages of **railways** for transport, as compared with ordinary carriage-roads, are so obvious that it is unnecessary to enlarge upon them. One fact only may be mentioned by way of illustrating the extent of the revolution brought about in modern commerce by the introduction of railways. Whereas wheat may be profitably carried by rail and water a distance of 15,000 miles from the United States to a European seaport, it can rarely be grown with profit west of Lake

[1] Smiles's *Lives of the Engineers*: Metcalfe and Telford, pp. 65, 68, 246.

Michigan, more than twenty miles from a railway.[1] A very few further remarks under this head will suffice. It may be worth while to point out that railways, such as we know them, were not altogether a sudden revolution in the mode of transport. Like so many other important inventions and discoveries, they were led up to by previous inventions. Railways preceded steam-railways, steam-engines preceded steam-locomotives. The first iron railways were made for horse-carriages or trucks used in connection with coal-pits. The patents for Watt's inventions by means of which the steam-engine of modern industry was introduced were taken out between 1769 and 1782, but it was not till 1804 that Trevithick built the first locomotive in the modern sense, and nearly ten years later before Hedley and Stephenson, independently of each other, constructed their improved forms from which the modern locomotive is descended by further improvement. The first steam-railway for general purposes was that between Stockton and Darlington, opened in 1825. The Liverpool-Manchester line followed in 1830. In the next year ran the first passenger train on the American continent —from Albany to Schenectady in the State of New York; and in 1835 was opened the railway from Brussels to Malines, the first on the mainland of Europe. **Ship-railways** have also been proposed as a means of cheapening transport. By these it was designed to carry loaded vessels from one sea to another. The ships were to be lifted out of the water and transferred to cars, being at the same time carefully poised, so that the weight of the cargo should be balanced by external pressure as when the ships were in the water.[2]

93. On the **routes of railways** the structure of the country has in some respects an even more marked effect than upon those of roads; but the circumstance just alluded to, the superior utility of railways when once made, has in many cases justified a greater expenditure in subduing the face of nature in order to make routes for railways where the features of the country did not afford them. Hence it is that railways, besides being made to climb the Andes to the height of 15,600 feet,[3] have been pierced through the Alps in tunnels of from seven to nearly ten miles in length. In mountainous countries the construction of railways has been greatly promoted by the adoption of **rack-railways,** and more particularly the modification known as the **Abt system,** in which the locomotive can use the rack or toothed rail on steep mountain tracks (even with a steeper gradient than 1 in 2), and on level tracks can proceed in the ordinary manner. The first mountain rack-railway was that up Mt. Washington in New Hampshire, U.S., designed by Marsh and completed in 1868.

94. One of the most recent devices for the facilitation of land-

[1] This was stated in the report on the United States census of 1880. Probably wheat in those regions would not now be able to stand the cost of road-carriage for so much as twenty miles.

[2] The projects for such railways seem to have been abandoned.

[3] A tunnel has been made at this height for the Lima-Oroya railway.

carriage is the system known as **telpherage**, due to Prof. Fleeming Jenkin in combination with Profs. Ayrton and Perry. In this system electricity is employed to propel small carriages suspended from a single steel rod supported on posts; and the system promises to present great advantages for the carriage of small loads, such as may be drawn by horses or on light tramways. A telpher line demands little roadway. It can, in fact, be carried over fields and pasture-lands without interfering much with agricultural operations; and it can easily be constructed over uneven ground, and even across streams, as well as less formidable obstacles. The first telpher line in England was opened in October 1885 at Glynde, in Sussex. It is rather less than a mile in length.

95. Water carriage has since the eighteenth century undergone as great a revolution as land carriage. The simplest form of water carriage is that in which **rafts** are allowed to drift down the course of a river. The use of boats on rivers, both for down- and up-stream navigation, must, however, have been one of the earliest of human inventions; and in some parts of the world, as in Russia and the valley of the Ganges, the want of roads was long to a large extent made up for by the abundance of navigable rivers. The introduction of railways has in many places greatly diminished the importance of river navigation; but large rivers on which steamers can be used still form important means of communication (**577***a*, **612***a*), and especially in countries not yet fully opened to modern commerce. If they served no other purpose they would still be of commercial value as tending to keep down rates on competing lines of railway (**612***a*, **884**).

96. Navigable canals are another invention dating from the unrecorded periods of human history, and they also have had their importance diminished by the introduction of railways, though in some regions they have played an important part in the development of commerce (**888**). Level countries and regions are naturally those which abound most in canals, and in such, one of the chief uses of rivers is to feed navigable canals, as in more mountainous districts one of their chief uses is to afford water-power. The most important canals of modern times, however, are the **ship-canals** already constructed or in progress, connecting different seas.

97. Marine navigation is the mode of water carriage in which the most important developments have taken place. These developments affect the size of the vessels employed, the range of navigation, the precision with which a course can be laid down and followed, and the power used for propulsion.

98. The navigation of the sea **in small boats** for trade purposes is not yet quite extinct. The islanders of the Pacific Ocean and the Eastern Archipelago undertake short voyages in a great variety of small boats, and some of the islanders in the trade-wind region of the Pacific regularly set out in fleets of small boats on long expeditions, in

which they go far out of sight of land, guided only by the direction of the low waves which constantly prevail in these regions owing to the action of the steady wind.

99. Such adventurous enterprises unaided by the modern appliances for navigation are, however, the exception. In ancient times the Phœnicians were the most adventurous seamen, at least in European waters. About 1,000 years B.C. their vessels traversed the entire Mediterranean, and even went beyond the Pillars of Hercules (Strait of Gibraltar), possibly as far as the Scilly Isles, and about the beginning of the sixth century B.C. Phœnician seamen in the employment of Pharaoh Necho, King of Egypt, are credited with having made a voyage round Africa. But the most adventurous of their expeditions were mainly coasting voyages. Ancient writers of the first century A.D. mention as something recent the discovery of the use that could be made of the monsoon winds in sailing from the mouth of the Red Sea to India at one period of the year and back at another. It is at least certain that a trade of this nature was regularly organised within that century, but even these voyages were probably not wholly on the high seas. **Before the close of the middle ages, however, vessels sailed with the monsoons from the east coast of Africa direct to India and Ceylon.**

100. In modern times ocean navigation has been greatly facilitated by the use of the **mariner's compass.** This instrument, there can be no doubt, was known to the Chinese at a much earlier date than to Europeans. So far as can be ascertained, it was first known in Europe towards the close of the twelfth century. The Neapolitan Flavio Gioja (with doubtful warrant) gets the credit of having improved it in the fourteenth century, and since then it has undergone a long series of improvements, especially in the nineteenth century, when the increasing use of iron in shipbuilding has rendered it necessary to devise methods for neutralising the disturbing effects of that metal on the compass needle. It was not till sailors became accustomed to this instrument that they became bolder in their ventures. The Portuguese voyages in the fifteenth century, which added greatly to the knowledge of the west of Africa, were still for the most part coasting expeditions. It was in the last decade of that century that **Columbus discovered America** (1492), and **Vasco da Gama the sea-way to India** (1497–98)—a discovery hardly less important in the history of commerce, on account of the effect it had on the fortunes of the great trading centres of Italy and southern Germany (122).

101. It may here be mentioned that it was in the course of the voyages of the fifteenth century that European navigators first became acquainted with the great ocean currents and the regular winds, which are so important to sailing-vessels in certain parts of the ocean. It was natural that the name of **trade-winds** should be given to the most constant of all these winds, the easterly winds, that in the North

Atlantic Ocean could always be counted upon, within a greater or less distance of the equator, according to the period of the year, to assist the voyage from Africa to the West Indies.

102. For hundreds of years after the first use of the compass in Europe mariners were still without the means of determining with precision their course on the high seas. Improved **chronometers**, almost as indispensable for this purpose as the compass, date only from 1736.

103. Steam navigation, by which so great a revolution has been effected in sea carriage, originated, like steam railways, in the nineteenth century. Trials of steam-engines for the propulsion of vessels were, indeed, made before the end of the eighteenth century. But the patent for the first steamboat which proved a success, so far as locomotion was concerned, was taken out in 1801 by Symington, and a boat constructed on this patent had a few trials on the Forth and Clyde Canal. The first really successful steam-voyage on a river was that made in 1807 from New York to Albany on the Hudson in a vessel constructed by Fulton, who had previously seen Symington's boat in Scotland. In 1819 a ship crossed the Atlantic using steam as an auxiliary, and in 1838 two ships sailing about the same time from Cork and Bristol respectively, made what are considered the first commercially successful steam-voyages across the Atlantic. In 1820 an iron vessel made a voyage from London to Paris, and in 1832 the first ocean-going iron vessel, the *Elburkah*, made the voyage from Liverpool to the Niger. The subsequent history of shipping has shown a constant increase in the proportion of steam- to sailing-vessels in the shipping of the world, along with an increasing use of iron and steel, at the expense of wood, in ship-building.

104. Together with the changes just mentioned there has taken place a steady **increase in the size and speed of vessels**, especially passenger vessels, built for the great routes of commerce. The ships in which the great voyages of discovery were made in the fifteenth and sixteenth centuries were, according to our standard, very small. The largest of the three caravels with which Columbus discovered the New World was of only 100 tons burden. Frobisher effected his discoveries in 1576 with a ship of 25 tons and a pinnace of 10 tons, and Drake in 1577 set sail on his voyage round the world with five ships, of which the largest was only 100 tons. But we must not be misled by these figures as to the average dimensions of the merchant vessels of the period. Small vessels were often purposely chosen for voyages of discovery, as being better fitted for the exploration of unknown coasts. Even in the twelfth century, an average-sized merchantman in the Mediterranean appears to have had accommodation below deck for about 250 tons of cargo, besides a considerable cargo above deck. Nowadays, steamers are built of more than 10,000 tons burden; and so greatly has the speed been increased. that the voyage from Sandy Hook (New York

harbour) to Queenstown has been accomplished within six days, and that from London to Adelaide within four weeks.[1]

105. The increase in the size of steamers has been a necessary result or condition of the increase of speed, for the more rapid rate of progress has been achieved, to a large extent, ta the expense of an increased consumption of coal; so that on a long voyage a large amount of space is required merely for the accommodation of the fuel. But the higher speed is not solely due to this cause. Improvements in the construction of marine engines have in some cases given increased speed with economy of fuel; and among these improvements, the most important is the invention of the tri-compound or triple-expansion marine engine, in which the steam is passed in succession into three cylinders, so as to act on three pistons and utilise its expansive force to the utmost. By such improvements the consumption of fuel had in 1897 been reduced since the early days of steam navigation from between 5 and 7 lbs. to about 2 lbs. per indicated horse-power per hour. In recent years the steam turbine has been applied in marine engines. In such engines the steam, instead of acting on opposite sides of a piston reciprocally, is made to impinge continuously on a series of blades fixed to a revolving drum. By such an engine a speed of upwards of 32 knots an hour was attained on a torpedo-destroyer in 1897. Here also may be noted the increasing use of oil-fuel in ocean-steamers, and of petrol motors on inland waterways, as well as barges propelled by tugs at sea. Trains of barges have been used to convey timber to England from the Baltic, and coal from the United States to the West Indies.

106. The introduction of steam navigation has likewise led to the shortening of passages in another manner. Sailing-vessels are often compelled to lengthen their course in order to take advantage of favourable winds; but steamers, being nearly independent of the wind, can choose their own route. Hence the aim of the navigators of steam-vessels is to sail as nearly as possible on arcs belonging to the **great circles of the earth** connecting the ports of departure and arrival, such arcs being the shortest distance between the two ports.

107. One consequence of all these improvements of recent years has been the **reduction of freights**, and another the increase in the size and depth of the harbours belonging to the great seaports, or the establishment of outer ports for the accommodation of vessels unable to reach older ports in the neighbourhood. While such changes are

[1] The largest vessel yet built (1906) is the *Lusitania*, one of the two referred to in note 1 on p. 228. It is 790 feet long, 760 feet at the water-line, has a depth of 60½ feet and a displacement at 33½ feet draught of nearly 40,000 tons. To develop a speed of 25 knots per hour it will consume about 1,000 tons of coal per day. By a vessel of the Hamburg-American line the voyage from New York to Cherbourg (160 knots further than to Queenstown) has already been accomplished within 5½ days. Ordinary cargo steamers ('ocean tramps') of larger size are built with a cargo capacity (dead weight) of 5,000 to 9,000 tons, and to run at a speed of 10 to 11 knots.

brought about, it is obvious that in the competition between different countries, a great advantage belongs to those which are rich in deep and capacious natural harbours, or such as require least outlay to adapt them to the requirements of the present day.

108. In connection with the transport of goods, attention must also be drawn to the **importance of avoiding numerous handlings of commodities** in the course of transit. In the carriage of goods between New York and Guayaquil, on the coast of Ecuador, it is still necessary for the goods to be loaded and unloaded six times before they are landed on the wharfs at the port of destination. They have to be transferred from cart to vessel at New York, from vessel to railway-wagon at the Isthmus of Panama (Aspinwall), from railway-wagon to lighter and thence to ship at Panama, from ship to lighter and thence to the wharf at Guayaquil. The general tendency of the modern developments of transport has been to reduce the number of such handlings, and it is obvious that one of the effects of the introduction of railways has been to reduce the necessity for them, the same wagon being able to be sent over thousands of miles on interconnected lines. Illustrations of the modern simplifications in the handling of special commodities will be found under Wheat (**150** *e*, *f*), Petroleum (**404**, **405**), and Sugar (**307**).

109. POSTS AND TELEGRAPHS. Cheap postage is another of the gains to commerce that have accrued since 1800. The **penny post** was introduced in the United Kingdom in 1840; the **general postal union** owed its foundation to a conference held at Bern in 1874. The practical use of the **electric telegraph** dates only from 1846 (more than twenty years later than the introduction of steam railways), but the apparatus necessary for their working is so much less costly than that of railways that the spread of the electric telegraph over the world has been even more rapid than the use of steam for locomotion. The first message through a submarine cable (between the South Foreland and the coast of France) was sent on November 13, 1851. In 1866 was laid the first permanently successful submarine cable across the Atlantic Ocean. Now many cables cross the North Atlantic, and since the completion of the cable from Vancouver by way of Fanning, Fiji, and Norfolk Islands to New Zealand and Australia in 1902, all the oceans have their opposite sides connected by this means. In recent years also renewed attention has been given to wireless telegraphy, which, on various systems, has been found of great use in communicating between different ships at sea, and between ships and the shore. Communication by wireless telegraphy on the Marconi system (that which is coming into most general use) was established between the Lizard, in Cornwall, and the Isle of Wight, a distance of 200 miles, in January 1901, and projects are now (1903) entertained for establishing regular communication by the same means between opposite sides of the Atlantic.

109a. The chief commercial advantages resulting from the introduction of the electric telegraph are these. First, without its aid in signalling it would be impossible to work the traffic on the busier railways; second, it allows of a great reduction in the amount of stock kept in store[1]; and third, it reduces the risk of loss through fluctuations in prices.

110. The telephone, which has recently proved so important an aid in local communication, first became known in its present form at the Philadelphia Exhibition in 1876.

111. One effect of all the recent improvements in the means of transport and communication has been to enable places remote from the seat of production of any particular commodity to supply themselves with that commodity more directly than previously. Shipping lines have been multiplied to all inhabited coasts; railways thread their way in most parts of the world, wherever there is even a tolerably dense population; the wants of any district can be communicated at once to the ends of the earth; and the consequence is, that goods can be sent in the most direct way, wherever they are needed in sufficient quantity to require special means of carriage. But it is obviously impossible that most articles of commerce can ever be sent from the place where they are produced to the places in which they are used or consumed without changing hands many times, and it is manifestly convenient that the exchange should take place, wherever possible, on a great scale.

112. COMMERCIAL TOWNS. Hence it arises that there are certain places in which it is most convenient for the exchange on a great scale to take place. These are great business centres, commercial towns; and the situation of these towns in many cases shows that there are special conveniences for exchange that have favoured their rise and growth. All towns are more or less centres of exchange. Whatever else they may be, they are places where stores of goods in common request are kept, so that the inhabitants of the district round may be able to supply themselves with these when they wish. But in order that a town may grow up to be a great business centre it must have special advantages of one kind or another for the exchange of goods or a certain class of goods.

113. These advantages may be of very various kinds. The mere fact that a town lies about the middle of a densely peopled district is likely to make it in many cases the most convenient place of exchange for the products of that district and the articles brought from more distant parts to be used within it. Hither are brought in large quantity the various products from the parts in which they most abound, and hence they are sent out again in smaller quantities, along with quantities of other kinds of goods, to the parts in which they are required.

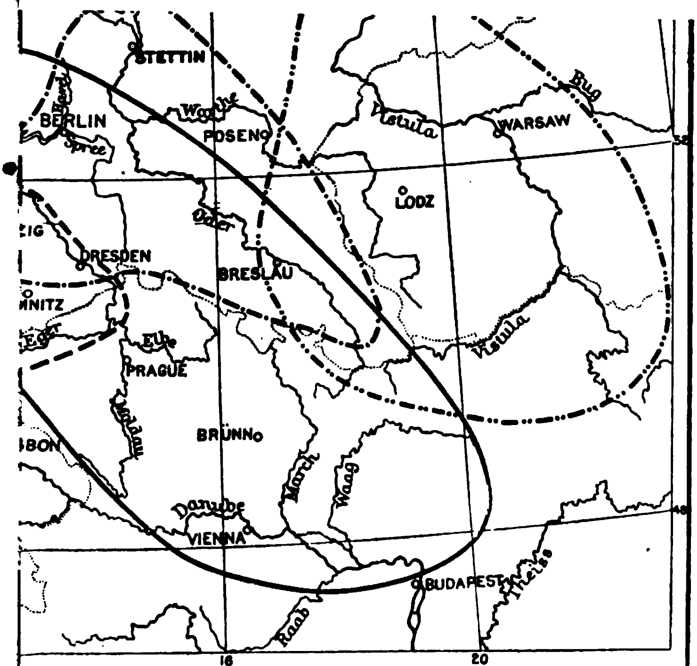
[1] It is stated, for example, that only about a fortnight's supply of wheat is now held at any one time in London.

114. So, too, towns that are situated where the form of the surface in the country round about causes a number of roads to converge are likely to grow up into more or less important business centres. If a town is situated in a more or less open expanse enclosed by hilly country through which valleys have allowed roads to be made in different directions, it will naturally be the centre of business for the districts to which these roads lead, and its importance as such will probably be in proportion to the productiveness of the surrounding regions. Since from a level country roads will naturally converge towards passes which lead over hills or mountains, towns are apt to arise, in such situations, at the meeting of hill and plain. In like manner, many towns have grown up at spots where for any reason there was a convenient crossing-place on a river, and many others exist at the confluence of navigable rivers where the nature of the ground is suitable for a site, for the traffic borne on the rivers is there divided.

115. Business towns likewise spring up in many situations in which the circumstances necessitate a change in the mode of carriage. Of this class of towns, seaports are the most numerous examples. Where goods have to be transferred from any mode of land carriage to ships, there must necessarily be a town to accommodate those engaged in this transfer. Hence it is that so many of the large towns of the world are seaports, the relative importance of which depends chiefly on the productiveness and accessibility of the regions served by them, or, in a single word, of their **hinderlands**, and the facilities which they afford to shipping.

115*a*. The term hinderland [1] is one that may be used both with reference to a single seaport and to a seaboard on which there are several seaports, and may be defined as the land which lies behind a seaport or a seaboard, and supplies the bulk of the exports, and in which are distributed the bulk of the imports of that seaport or seaboard, either generally or in relation to certain seas. The necessity for the last clause in this definition arises from the way in which the outline of the land sometimes determines the port with which an inland region communicates in its relations with different parts of the world. Thus the West Riding of Yorkshire may be included in the hinderland of Liverpool for Irish and even a considerable amount of trans-Atlantic trade, but for North Sea trade it obviously belongs to the hinderland of Hull, Goole, or Grimsby. The Elbe basin forms the chief part of the hinderland of Hamburg in relation to all North Sea and oceanic traffic, but is included in that of Lübeck in relation to

[1] This word, in its German form *hinterland*, was first introduced into English, so far as I am aware, about 1884, in connection with the discussions that arose on the occupation of parts of the West African coast. It came at once into general use from the fact of its meeting an obvious requirement, but it seems to me that, when so essential a word can be changed from German to English by the alteration of a single letter, it is to be regretted that the English, almost self-explanatory, form of the word is not universally adopted.



o., *London, New York & Bombay.*

the Baltic. Toulouse belongs to the hinderland of Bordeaux for all traffic except that of the Mediterranean, for which it would naturally make use of Cette or even of Marseilles.

115*b*. From some of the examples just given, it will be observed that the hinderlands of different ports may overlap even in relation to the same seas. This arises from the facts referred to at the end of paragraph 115, the influence on a seaport of shipping facilities and facilities for communication with the hinderland. The hinderlands of Hull and Goole to a large extent coincide, but where the economy of transport effected by the use of large ships is the chief consideration, Hull will be preferred on account of the superior facilities for shipping there afforded, but where smaller vessels serve the requirements of a particular trade, Goole may and probably will have the preference in consequence of being nearer the hinderland. The trade of Quebec may encroach on the hinderland of Montreal, but its distance from that hinderland will prevent it from doing so except in the case of such traffic as is greatly promoted by rapidity of transit, such as passenger traffic, and traffic in the more perishable, or more valuable and less bulky commodities. Trade rivalries and the nature of the internal means of communication also affect the competition of ports in the same hinderland, as in the case of Grimsby and Hull. Lastly, it should be pointed out on this head that the extent and importance of a hinderland may be greatly increased by improvements in the means of internal communication; and for illustration of this remark it will be enough to refer to what is said in paragraph 741 with regard to Bombay.

116. The frequent necessity for change in the mode of carriage also helps to explain why towns are apt to grow up at the foot of pass-roads, and the same circumstance likewise explains the precise situation of many towns situated on rivers. Many such towns are situated at the highest point to which rivers can be navigated, or can be ascended by vessels of a certain size; many, where a rapid hinders, or a fall prevents further navigation. To one or other such point goods are conveyed by boats, and a town springs up where they are landed. Other towns on navigable rivers are situated where there is a sudden change in the direction of the stream, because at that point goods must be landed which are not intended to follow the new direction taken by the river.

117. Since the development of machinery, many large towns have sprung up where there is abundance of coal, or coal and iron, or extensive water-power, the mainsprings of modern industry; and all such towns are more or less business centres. Yet they are often far from being business centres in proportion to the extent of their production. Where numerous manufacturing towns exist on a great coalfield the business of exchange may be centred in one of them that is not pre-eminently itself a manufacturing town. The great magnitude of

the business of exchange in such a region is adverse to the carrying on of manufactures in its business centre, for the cost of land, owing to the requirements of merchants and others for offices, &c., becomes so great that it is too expensive to erect large factories. Hence it is that Manchester, in which, according to the estimate[1] of a local manufacturer, is sold probably three-fourths of the cotton-yarn spun, and even a larger proportion of the cotton cloth woven in the United Kingdom, is less of a manufacturing town than many of the smaller towns round about.

118. With regard to the relative importance of towns at the present day, it is necessary to bear in mind that their prosperity is often due to other circumstances than those which determined their original situation and favoured their early growth. The very fact that a town exists and has attained a moderate size makes it a more or less convenient centre of exchange, and hence may make it worth while to increase its facilities for this purpose. Growing up, in the first place, it may be, at a point to which roads naturally converged, it became of sufficient importance to have new roads made from it. So in modern times railways have been made to towns because the towns already existed; and now the prosperity of the town is determined by the railways. In many cases the introduction of railways has favoured some towns at the expense of others, which may before their introduction have had a more favourable site. But the importance of such natural advantages as have been pointed out above is still to be seen in situations where towns grow up in new countries before railways are introduced.

119. The great business centres of the present day in populous countries fully provided with the modern means of transport are places in which the staple commodities can be procured at any time, in any quantity in which they are likely to be wanted; but it was different in former times, and is still different in less populous and less commercially developed countries. In the latter countries it is still the custom, as it once was more generally, to hold periodical **fairs** at certain places at stated times. At these fairs merchants congregate from a greater or less area round in proportion to the importance of the transactions carried on, and the local dealers, in a single journey to the great market, supply themselves with all they are likely to want till the next fair. The places chosen for fairs are naturally, in many cases, such as present peculiar facilities for communication in several directions. In eastern countries, great fairs are often at the same time great religious festivals, as at Mecca in Arabia, Allahábád and Hardwár in India, and the place of the fair is determined chiefly on religious grounds.

120. The **pilgrimages to Mecca**, which form so important a feature of the Mohammedan religion, may here be specially noticed. All

[1] Made about 1885.

Mohammedans, poor or rich, are enjoined by their religion to proceed at least once in their lives to the sacred city of Mecca. The poor live by the way on alms, but most of those who are better off take with them all their possessions, thinking them well spent in accomplishing this object of devotion, or, if they are rich enough to have goods to spare at the end of their journey, hoping to increase their wealth by trade, which the more fortunate of them all the more easily do, since thousands of pilgrims are compelled to part with all that they have left for whatever they can get. In certain cases these pilgrimages have been of use in introducing the products of one region into another. The Arabian coffee-plant, for example, is said to have been introduced into southern India by a pilgrim on his return home.

121. **COMMERCIAL COUNTRIES. The facilities for exchange that have given to certain towns a high degree of importance as business centres have during certain periods secured a commanding position in the commerce of the world for different nations.** One of the chief advantages for holding such a position lies in occupying a central situation between the regions with which the great commerce of the world is carried on. In the middle ages the most valuable commerce was that between eastern Asia and Europe; and as long as this was carried on through western Asia or by the Red Sea, **Italy** had peculiar advantages for securing the bulk of that commerce. The ships of Genoa and Venice visited all the coasts of the Mediterranean and the Black Sea and of western Europe, and the commerce with the heart of Europe was carried on by way of the Alpine passes. It is owing to the former pre-eminence of the Italian cities in this trade that so many places in the east of the Mediterranean have Italian names or names of an Italian form. The name Levant for the east of the Mediterranean is itself a name of Italian origin; the names Negroponte, Montenegro, and others are Italian; and Aleppo is an Italian form of the local name of that town.

122. Before the close of the fifteenth century some of the land routes for commerce with the east had already been closed through political events (697), but the discovery of the sea-way to India round the Cape of Good Hope (100) gave the most serious blow to the eastern trade of the Italian cities (677*a*–*c*). In 1504, a contemporary chronicler records, the galleys of Alexandria returned in February to Venice empty—a thing that had never been seen before, and in March those from Beirut were found to be empty likewise. The chronicle is continued till 1512, and speaks constantly of the scarcity of spices in Venice. In 1506 it is specially noted that at a fair in that year the Germans had bought very little. As early as 1504 a project for cutting a sea-canal through the Isthmus of Suez, with the view of regaining for Venice its lost supremacy, began to be urged; but this project, it is needless to say, was never carried out under Venetian auspices. The trade with Germany still continued, indeed, during the

whole of the century, and also the following century; but it was in a state of decline. At first eastern commodities were to be purchased at Lisbon, but soon the towns of **Flanders** and **Holland** (Antwerp and Rotterdam—**567***a*) secured the bulk of the commerce with central Europe. But as commerce has grown more world-wide, as the New World has become more populous and more wealthy, the advantage of situation has come to belong to the **British Isles**, which are nearly in the middle of the land-surface of the globe. This is far, however, from being the sole advantage which Great Britain possesses as a mercantile country, and hence the nature of this and other advantages will be more particularly considered elsewhere.

123. LANGUAGE, &c. The language of commerce, when carried on between peoples speaking different tongues, is generally of a very mongrel character. In the days when Italian trade was predominant in the Levant, there arose in all the coasts of that region a trade language, the basis of which was a corrupt Italian, but which borrowed numerous words from the local dialects in different places. This language is known as the **lingua franca**, and is still spoken in many Mediterranean towns, above all in Smyrna. The dominant languages of commerce at the present day have all begotten corrupt forms of speech of a similar nature. In Chinese ports a mongrel kind of English is spoken, which is known as '**pijin' English** (*pijin* being the Chinese pronunciation or corruption of *business*). A '**negro English**' is spoken in many places on the west coast of Africa, another kind of mongrel English in New Guinea. **Arabic** is spoken with many corruptions, and much admixture of words derived from other languages throughout the Mohammedan world. **Chinese**, in some form or other, is the prevailing language of trade, not only in China itself, but on all the coasts of Indo-China, and the **Malay** language predominates in the Eastern or Malay Archipelago. **Spanish** is the prevailing language of the New World south of the United States, except in Guiana and Brazil. The wide predominance of Spanish commerce in former days is still seen in the survival of a few Spanish words in more than one *lingua franca*, of which English or some other language forms the basis.

124. At the great fairs frequented by merchants from many regions in which different languages are spoken, no mongrel speech, however well established, suffices for commercial intercourse, and there the business of **interpreter** (often combined with that of broker) is an important one. Andrée mentions that he knew an interpreter of Nizhniy-Novgorod who, besides German, could speak all the Romance languages, and, moreover, Russian and Polish, Tatar and Persian, Arabic and Armenian, Hindustani and modern Greek.

125. Where there is neither a common language nor an interpreter available, traders are necessarily reduced to the use of **signs**; but this mode of doing business is sometimes resorted to for another reason,

namely, to enable business to be transacted in open markets without the knowledge and interference of bystanders. On the Red Sea coast a code of signs with the fingers for trade has come into very general use, the signs consisting in touching different parts of the hand and fingers, and being made under a cloth which conceals from parties not engaged in the transaction the nature of the signs made.

126. INSTRUMENTS OF EXCHANGE. Another indispensable means of carrying on trade on a great scale is the existence of some common measure of value. Such a common measure, when it is used for no other purpose, or when used chiefly for that purpose, is **money.** In intercourse with uncivilised peoples it is still necessary in a great many cases to resort to **barter**—that is, to the exchange of articles that are intended for other purposes than media of exchange. Thus, on the west coast of Africa, palm-oil, rubber, and other products are bought with cotton-stuffs, rum, and muskets; on the Senegal gum is bought with printed calico; in the interior of Africa Dr. Junker found that he could buy a sheep or a goat with a yard of white cotton; in many parts of Africa coloured beads, which are worn as ornaments, are a very common means of purchase. In the interior of Borneo the price of a picul (133½ lbs.) of gutta-percha is 'an old Tower musket, a piece of white cotton shirting, and a small quantity of salt.' In the old trapping days of the Hudson's Bay Company, at the time when beaver-skins were of great value in Europe, a trade gun would buy from the Indians as many beaver-skins as could be piled up on each side of it. Even in a civilised country like Persia, we are informed that 'in the Resht trade money seldom passes; the goods are bartered against Russian or English piece-goods.' (For. Off. Papers, Ann. Ser. No. 113.)

126*a*. One of the less obvious inconveniences of this mode of carrying on trade is the fact that the articles used as a means of purchase are in many cases accepted only over a very limited area. The equipment required for an expedition into one part of the interior of Africa may be different from that required on an adjoining route. On the one the natives will take, it may be, chiefly cotton goods; by another, only beads and copper wire. The coloured cloths and beads that find favour in one division of the Mozambique coast of Africa are not to the taste of the inhabitants of another part, and for one district in this region a peculiar kind of native hoe has to be manufactured.

126*b*. But even where trade is carried on by barter the need for some common measure of value soon comes to be felt, and hence some article of exchange in very general use is adopted as a standard with which the other articles of barter are compared. Thus, in western Africa a piece of cotton-cloth of about six yards in length has come to be very generally recognised as a unit of value, and as one yard forms a smaller unit, a piece of cloth of that size is usually made up into six folds.

127. The articles that have been and are used as money in different

parts of the world are very various. Of all non-metallic kinds of money, that which has come into most extensive use is the cowrie-shell (*Cypræa moneta*), which is very largely used in the trade of Africa and southern Asia, as well as in the islands of the Pacific. The home of this shell is the Pacific and Indian Oceans, and ship-loads of it are conveyed from the Maldive Islands, the Philippines, and other island groups, to the European ports which carry on trade with the African tribes among which this kind of money circulates. In New Guinea a small kind of cowrie is threaded in hundreds on slips of cane, and these slips serve as money. On the island of Yap, in the western Carolines, the money takes the highly inconvenient form of huge discs of aragonite, a form of carbonate of lime, quarried, it is said, two hundred miles away, in the Pelew Islands. In ancient Mexico the currency of the country consisted of 'bits of tin stamped with a character like a T; bags of cacao, the value of which was regulated by their size; and, lastly, quills filled with gold-dust.'[1] Even on the Atlantic coast of the United States at the present day,[2] oysters are stated to be used as money in a certain district on Chesapeake Bay, an oyster forming the regular subscription of a daily newspaper.

128. Of all forms of money the most convenient, and those in most general use, are **gold and silver or other metallic coins**, and the coining of metals is in all civilised countries one of the prerogatives of the government. Coins are seldom made of any one metal. For convenience of manufacture various alloys are used, but all coins on their issue from the mint ought to possess a definite weight of the principal metal in their composition, whether gold, silver, or copper. The proportion of that metal to the total weight of the coin is called the **fineness** of the coin.

129. The value of a coin does not always depend solely on the amount of fine metal which the coin contains. Coined money is of two sorts, which are called respectively **standard money** and **token money**. The former is that in which the fine metal used is the standard metal of the country—that is, the metal which ultimately fixes the value of all the coins used in the country. In order that any particular metal should form a perfect standard, the conditions that must be fulfilled are these. The metal in question must be received for coinage in unlimited quantities by the state, and coins made with that metal must be made unlimited legal tender; that is to say, payment in such coins must be declared to be a valid discharge of any debt, however large. If gold, therefore, is the standard metal of any country, any gold company can take as much gold as it raises to the mint of that country, and receive in exchange the same quantity of gold in the form of coin, with a small reduction, it may be, for the expense of coining. In these circumstances, it is obvious that the

[1] Prescott, *Conquest of Mexico*, vol. ii., ch. ii.
[2] So at least it was stated in 1888.

value of the gold is represented exactly by the value of the equivalent coin, and the value of the coin will rise and fall with the value of the gold.

130. It is otherwise, however, with **token money.** The value of the fine metal in such money is fixed by law in relation to the value of the standard metal. The non-standard metal is not received in unlimited quantity for coinage at the mint; and when the money made with it is merely a token money, it is not made legal tender except in payment of small sums. Thus in the United Kingdom, in which gold is the standard, silver coins are not legal tender above the value of 40*s*., and copper coins not above 1*s*. In some countries both gold and silver coins are made legal tender in unlimited quantities, but this law is to a large extent nullified by the limitation of the silver coinage issued by the mint. Where silver or copper coins are mere token money, they represent in coins a greater value, and sometimes a much greater value, than that of the fine metal contained in them. At the average price of silver in 1886 the English mint could buy for 3*s*. 9½*d*. enough silver to make silver coins to the value of 5*s*. 6*d*.

131. Such **variations in the value of silver compared with that of gold** make it necessary to take the value of silver into account in comparing the value of the commerce of a country having a silver standard with that of another having a gold standard, when the values are expressed in the standard money of the respective countries. In the Appendix a table showing the average value of silver in London per ounce is given for each year from 1878 downwards, along with the fine weights of the standard coins of all the countries that are of much importance commercially, the gold- and silver-standard countries being distinguished from one another. When the variations in the price of silver are great they are the chief cause of the fluctuations in the rate of exchange between gold- and silver-standard countries—that is, the fluctuations in the amount of the coinage of the one country that is taken as equivalent to a certain amount in the other.

132. Though in gold-standard countries it is customary and natural to speak of fluctuations in the price of silver, it must not be supposed that gold does not vary in value. Where it is the standard of a country, it is true that its value, expressed in the coinage of that country, cannot vary. But it is obvious that a change in the value of silver in relation to gold (such as we have just been speaking of) is a change in the value of gold in relation to silver; and in silver-standard countries it is as natural to speak of changes in the price of gold as in gold-standard countries it is to speak of changes in the price of silver.

133. Moreover, everybody is familiar with the fact of variations in the price of commodities. Now in gold-standard countries there are not only variations in the value of these commodities in relation to gold, but also in that of gold in relation to them. Where there has been a greater or smaller change in one direction (whether a

rise or fall) of all or nearly all commodities, it will be right to say absolutely that, whatever the cause may have been, there has been a change in the value of gold. When distant dates are compared (intervals of a generation, or one, two, or three centuries, for example) it is nearly always found that such a change in value has occurred. This is not the place to elucidate the nature and cause of such changes, but it is important to bear in mind that, whereas statistics of commerce in which values are expressed in the same standard coin afford a more or less satisfactory means of comparing different countries at the same period, they are far from being so satisfactory as a means of comparing the commerce of the same country at widely different dates. The sum of 5,000,000*l.* in 1800 is a very different thing from the same sum in 1900.

134. We must here refer also to the fact that money in the form of coin is used only to a very limited extent in the discharge of pecuniary obligations, whether the parties belong to the same country or to different countries. The equivalent of coin in paper is the more usual mode of payment in the case of all but small transactions, and the proportion of debts discharged in this way is generally greater in proportion to the commercial development of the country in which the transactions occur.

135. Whatever the form of a **paper circulation** may be, its efficiency as a perfect substitute for coins depends on the fact of the holder of the paper being able to obtain the equivalent in coin whenever he wishes it. In payments made within the bounds of any particular country, the most usual substitutes for coin are **bank-notes** and **cheques.** Bank-notes are promises of a bank to pay; cheques, orders to a bank to pay, made by persons who have money at their credit in the banks on which the orders are made. In large transactions, payment is very often made in the form of a **bill of exchange**, which is a demand upon a merchant to pay at a certain date a certain sum of money for goods which he has received. Such a demand is usually presented to the merchant on whom it is drawn for his acceptance, which he signifies by his signature, and when accepted by him it becomes a valid claim against him. The details in connection with the use of bills of exchange are far too numerous to be mentioned here; but it is necessary to state that it is usually in connection with such bills that the **rate of exchange** between different countries is spoken of. Bills of exchange are very generally made use of in settling debts between persons belonging to different countries, because they are a cheaper method of doing so than using coins for the purpose. If coin, or bullion, whether gold or silver, were sent, the cost of its carriage would have to be paid for; it would have to be insured, and other expenses would have to be incurred. It is obviously, therefore, a cheaper method for a merchant who has a claim against him in another country to send over an equivalent claim which somebody else may have on some one in that country. He buys that claim in the form of a bill of exchange,

and the price which he has to pay for it varies according to circumstances. It varies according to the credit of the person or persons who accept responsibility for the bill, according to the date at which it becomes due (being obviously of less value if payable three months after date than if payable at sight); and even with the 'best' bills—that is, those secured in the most satisfactory way by the credit of the responsible parties—it varies according to the state of trade between different countries. When the bills procurable in one country, A, against another country, B, are greater in value than those in B against A (which is equivalent to saying, when A has exported to B a greater value than B to A), A will have more bills than are necessary to meet the claims of B. Those holding such bills in A will, accordingly, be unable to get as good a price for bills as those in B who hold bills on A. They will be glad to sell them at as good a price as they can get, for they run the risk of being unable to find a customer for them, and hence being obliged to bear the expense of having coin sent over to them in discharge of their claims. Holders of bills against A in B, on the other hand, will find that there is a great demand for their bills on the part of persons who fear lest they may have to bear the expense of sending coin over in discharge of their debts, and will therefore ask as high a price as they find they can exact.

136. Readers must be referred elsewhere for fuller information on these matters, but enough has been said to make **three facts of importance** manifest: **first**, that the rate of exchange for the equivalents of the same coins may be different in one country from what it is in the other (which, in fact, it usually is); **second**, that there may be differences in the rate of exchange between countries having the same standard coin (as England and Australia); and **third**, that in normal circumstances the extreme limit of fluctuation in the rate of exchange for bills payable at sight, above or below the exact equivalent of the coinage of the one country in the coinage of the other, must be the cost of transmitting the coin itself. For it is obvious that no one would pay for a bill wherewith to discharge a certain claim in money more than it would cost him to send the necessary coin or bullion.

137. The rate of exchange between different countries is further complicated when the currency of a country is in the form of **inconvertible paper money**—that is, where the government of the country issues notes professing to be of the value written upon them, and makes them legal tender for any amount in transactions between the inhabitants of that country, but refuses to give coin in exchange for them on demand. In such cases the paper money always circulates at a greater or less rate below the value of the coin which it professes to represent.

Tables of the more important standard coins and moneys of account and of the principal units of the metric system of weights and measures are given in the Appendix.

COMMODITIES

I. COMMODITIES DEPENDENT DIRECTLY OR INDIRECTLY ON CLIMATE

A. Products of the Temperate Zone.

138. WHEAT. This, the most valuable of all the grains of temperate climates, has been cultivated from the remotest antiquity. The remains discovered at the Lake-dwellings of Switzerland belonging to the Neolithic period, or New Stone Age, show that at that time, long before the beginning of written history, as many as five different varieties of wheat were already in cultivation. The crop early acquired an important place as an object of agriculture in all parts of the temperate zone in the Old World where the climate was favourable to it, and gradually extended its domain at the expense of other crops which in certain regions were more easily grown, but which yielded a less valuable grain. Though **in the New World** wheat, like most other grain crops, was **unknown in the time of Columbus**, its cultivation has since spread there to such an extent that Europe now makes up by supplies obtained thence the greater part of her own deficiency in this cereal. In Australasia also this grain is now in general cultivation, and in fact there is no part of the world with a suitable climate and a sufficient population where wheat is still unknown.

139. A crop so valuable, so widespread, and so long in cultivation could not fail to exhibit a great number of **varieties** and to show the result of past care in improved quality. The varieties of wheat cultivated at the present day yield larger grains than those of the ancient Lake-dwellings. The number of the varieties now grown is probably in a literal sense countless, new varieties being constantly produced. Very often these varieties, as in the case of other cultivated plants, manifest strong local preferences, and do not flourish except in particular regions. The seeds of English wheat fail in India; and on the other hand, the wheat-growing region of northern India, in which the crop has to ripen during the cool season (**729, 734**) before the advent of the scorching heats of summer, has developed varieties of wheat which ripen in a shorter period than those of colder climates, but which pine and dwindle when an attempt is made to grow them in England. Not only does the behaviour of the crop under cultivation thus vary in different regions, but there is also a difference in the

composition of the grain derived from crops grown in different parts of the world.

140. The **best soil** for the cultivation of wheat is one in which clay predominates, but which is not too stiff and heavy. As regards **climate**, wheat demands a higher temperature than any of the ordinary cereals of the temperate zone, except maize, so that its northern limit lies to the south of those of oats, rye, and barley. Further details of interest regarding the soil and climate best adapted for wheat are given in the following paragraphs, extracted from the report in the Tenth Census of the United States.

140*a*. 'As regards soils, we may say in a general way that light clays and heavy loams are the best for wheat. On the one hand, very heavy clays often produce good crops, both as to yield and as to quality; and, on the other hand, the lighter soils may yield a good quality—it is simply smaller in quantity. The best crops, however, come from moderately stiff soils, but any fertile soil will produce good wheat if all the other conditions are favourable. . . .

'Good wheat-lands agree in this: that they are sufficiently rolling for natural drainage, are at the same time level enough to admit of the use of field machinery, and are easily tilled, admitting the use of light field implements in their tillage, and thus allowing of a very large production of grain in proportion to the amount of human labour employed. . . .

140*b*. 'For commercial as well as agricultural success, climate is an all-controlling condition. Wheat is normally a winter annual. For a good crop the seed must germinate and the young plant grow during the cool and moist part of the year, which season determines the ultimate density of growth on the ground, and consequently mostly determines the yield. It ripens in the warmer and drier parts of the year, which season more largely determines the quality, plumpness, and colour of the grain. In climates with winters so cold that all vegetable growth is suspended, we have two distinct classes of varieties, known respectively as spring and winter wheats. . . . In California, and in similar climates, as in Egypt, this distinction does not exist in respect to their cultivation, although the varieties partake more of the character of winter wheats than of spring, both in their mode of growth and in the character of the flour made from them.

140*c*. 'But in all climates, and whatever variety may be grown, the crop must be sown and have its early growth in a cool part of the year. Wheat branches [" tillers "] only at the ground, and produces no more heads than stalks, and it only sends out these branches early in its growth or during cool weather, and when the growth is comparatively slow. . . . A cool, prolonged, and rather wet spring is therefore best for the ultimate yield of the crop . . . a warm, rather dry, rapidly growing, and early spring . . . diminishes the yield; there are then fewer stalks, and the heads are fewer. . . .

140*d*. 'In a country of cold winters, for good crops it is better that the ground be continuously covered with snow. Bare ground, freezing and thawing, now exposed to cold and dry winds, and now to warm sunshine, is exceedingly destructive to wheat. It "winter-kills" in two ways: it may be frozen to death by cold, dry winds, or, as is more often the case, particularly in soils rich in vegetable matter, it "heaves out," and by the alternate freezing and thawing of the surface soil the roots are lifted out of the soil and the young plant perishes. . . .

140*e*. 'The ideal climate for wheat is one with a long and rather wet winter, with but little or no frost, prolonged into a cool and rather wet spring, which gradually fades into a warmer summer, the weather growing gradually drier as it grows warmer.

140*f*. 'The quality of the grain is largely determined by the climate, a hot, dry, and sunny harvest-time being best for wheat of the first grade. . . . The wheat of sunny climates—those of California, Egypt, Northern Africa, and similar countries—has always ranked high for quality. . . . The particularly bright character of American grain depends upon the climate rather than upon the soil. The sunny climate of the whole United States south and west of New England is favourable for this, and from the time of the first settlement of the colonies the bright colour of American grain as compared with that of Northern Europe, particularly that of Great Britain, has been remarked.'[1]

141. The following table gives some typical illustrations of the **differences in the average yield of wheat** in bushels per acre in different parts of the world :—

Countries.	Bushels.	Countries.	Bushels.	Countries.	Bushels.
England[2]	30	Austria[3]	15¾	U. States	13
Belgium	28	Hungary[4]	15½	Manitoba	20
Holland	28	Russia	8	Argentina	9
France	19	Italy	12	Victoria	8·4
Germany	24	India	7–13	New Zealand	26

It will be observed from the preceding table that the country which stands **highest in the list is England**, and that next to it are either those countries which, like England, have a dense population and a system of agriculture that has been undergoing continuous improvement for generations—countries, accordingly, in which manure is cheap relatively to the value of the land, or those countries or regions which are possessed of an extremely rich soil only recently brought under cultivation. Three cases of an exceptionally low produce per acre are worthy of special notice as illustrating the effects of different causes. In **Victoria**, which is the chief wheat-growing colony of Australasia,

[1] Tenth Census of United States: Statistics of Agriculture, Cereals, pp. 63, 64.

[2] The cultivation of wheat in Scotland and Ireland is not sufficiently general to afford an instructive return for a table such as this.

[3] Exclusive of Hungary. [4] Compare 614.

the low out-turn is to be ascribed mainly to the climate, which has but a scanty rainfall (956), and is hence unfavourable to the tillering of the wheat and the filling of the ear, but, it may be added, is warm and sunny, and hence highly favourable to the quality of the grain. In South Australia, which till recently was the chief wheat-growing part of Australia, the yield is even worse than in Victoria—only about 5 bushels to the acre, the rainfall being there scantier and more uncertain. In **Russia** the low average of the out-turn is in great part due to the backward state of cultivation, for the soil on which much of the Russian wheat is grown is one of the best in the world (629). A large part of the wheat-growing area of Russia may, however, like those of Victoria and South Australia, be described as lying on the margin of adequate rainfall, so that the yield of the crop varies greatly with the amount of the rainfall, and the same is true of such productive areas as Manitoba and the adjoining parts of the United States. In one of the governments of southern Russia (Voronezh), the aggregate yield of all cereals has been known to vary in the course of ten years in the ratio of 6 to 1. In the ten years 1890–99 the yield of wheat in Victoria[1] varied from a minimum of 4 to a maximum of 11·1, in South Australia from a minimum of 1·7 to a maximum of 7·9 bushels per acre. In Manitoba the average yield in 1900 was less than 9, in 1901 more than 25 bushels per acre. These may be compared with the returns for Tasmania and New Zealand, in which the rainfall is more ample, and in which the extreme yields in 1890–99 were about 15 and 27 and 18 and 38 bushels respectively. In Argentina several causes combine to bring about a low average yield. In some years droughts destroy the crops (especially in the west of the wheat-growing area), in other years floods, in others frosts (especially in the south), but more than all these, locusts (especially in the north). Hence here also there are great variations in the calculated yield. In 1896–97 it was estimated at about 5 bushels per acre, as against 16½ in 1893–94.

142. The superiority of wheat as a food-grain for man depends chiefly upon the quality of the bread made from the flour, which is generally regarded as more palatable than any kind of bread made from other grains, even though these may be little, if at all, inferior to wheat in nutritive properties; but this superiority is so generally recognised that it is difficult for us to realise the fact that wheaten bread was a rarity even in some parts of England within the last hundred years. It is still a rarity, at least for the poorer classes, over a large part of the European mainland, though it is now coming more and more into use even among the poor. This result is solely due to the rapid extension of commerce since the introduction of steam-power. Europe, while constantly increasing its consumption of wheat

[1] In 1903 the Victorian yield was only about 1·3 bushels per acre.

relatively to population, has been growing less and less able to supply its own wants in this article, and thus becoming more and more dependent on supplies from elsewhere. The consequence is, that the international commerce in wheat and wheat flour has not only come to exceed that in all other grains, but has grown to a magnitude rivalled only by that in a few other articles, such as cotton and wool, the two great clothing materials of the world. The great wheat-importing countries are those of the west of Europe, in which manufacturing industry is so highly advanced that there is a relatively large population dependent on supplies from abroad; and the United Kingdom stands at the head of the list, taking the largest share of the wheat export from all the great wheat-exporting countries, so that an account of the British wheat trade will serve to give a general view of the wheat supply of the whole world.

143. Early in the eighteenth century England could not only supply all her own wants in wheat, but in good years could even spare more than a quarter of a million bushels for export, and it was only towards the close of the century, after the great development of the cotton manufactures had begun, that the importation of grain became a regular necessity. The amount of the import continued on the whole to increase, notwithstanding the existence of import duties, which were generally fixed on a scale which imposed a very high duty when the price of wheat sank to a point which was then considered very low. In those days the chief supplies for the United Kingdom were derived from France and other countries belonging to the continent of Europe. From February 1, 1849, a uniform import duty of one shilling per quarter was established, and on June 1, 1869, even this was abolished, both wheat and flour being admitted into this country from that date duty free.[1] Meanwhile the dependence of the British Isles upon foreign wheat has been steadily increasing, and their sources of supply have become more widespread. It has been estimated that shortly after the middle of the nineteenth century the United Kingdom produced on an average between 70 and 80 per cent. of all the wheat consumed in the country, whereas on the average of recent years the proportion of home-grown wheat to the total consumed has sunk to somewhat less than 30 per cent.

144. The following table presents in a general view some of the most important facts relating to the British import-trade in wheat and wheat flour during six periods of five years from 1871. The British export trade in wheat, it may be mentioned, is trifling. A small quantity even of home-grown wheat is sometimes exported, but the whole of the British and foreign wheat annually exported from the United Kingdom is much less than one per cent. of the total import.

[1] A duty of 3*d.* per cwt. on wheat, 5*d.* on flour, was levied in 1902–3.

Total British Import of Wheat, whether as Grain or Flour, in Equivalent Weight of Grain.

Country of Origin	Percentage of total import					
	1871-5	1876-80	1881-5	1886-90	1891-5	1896-1900
Atlantic Ports . .	*29·4*	*41·8*	*35·4*	*32·5*	*41·6*	*49·7*
Pacific Ports . .	*10·4*	*11·5*	*18·1*	*15·6*	*10·5*	*9·9*
Total U. States .	39·8	53·3	53·5	48·1	52·1	59·6
Argentine Republic .	—	—	—	1·5	8·0	8·4
British N. America .	7·4	6·0	8·5	8·4	5·1	7·8
Russia . . .	23·4	12·6	11·7	18·5	14·3	9·6
India . . .	1·4	4·8	12·3	11·8	9·5	4·3
Australasia . .	2·2	3·7	5·2	2·4	8·0	1·7
Austria-Hungary .	0·9	2·2	2·6	3·0	1·5	1·5
Germany . . .	9·2	7·8	5·5	4·1	1·0	1·3
Others . . .	15·7	9·6	5·7	7·2	5·5	5·7
	Annual Average in Millions of Cwts.					
Total . . .	50·49	63·31	76·78	77·79	96·58	95·37

145. These vast imports have led, first, to a lowering of the price of wheat, the **mean of the yearly averages of the price of the imperial quarter of wheat** having sunk from 54*s*. 6*d*. in 1871–75 to 47*s*. 6*d*. in 1876–80, to 40*s*. 1*d*. in 1881–85, and to 31*s*. 9*d*. on the average of the two years 1886 and 1887. A further decline followed to a minimum of 22*s*. 10*d*. in 1894. This has led to a steady **contraction in the area devoted to wheat**, which in 1860 occupied about 4,000,000 acres in the **United Kingdom**, but on the average of the five years 1881–85, about 2,830,000 acres. A further decline followed. A minimum, 1,456,000 acres, occurred in 1895.

146. If we now look at the **sources of supply** as shown in the table, we observe, in the first place, that the eight countries individually mentioned in that table furnished in the last five of the periods more than 95 per cent. of the total import. In the two periods forming the last decade of the nineteenth century the striking feature is the largely increased proportion of a much larger total derived from America,[1] and

[1] The period 1901–5 was striking in several respects. There was once more a great advance in the total import, which amounted on the average to 111·64 million cwts. per annum. The ratio from the three American countries mentioned in the table fell, however, from an aggregate of nearly 76 per cent. to less than 63 per cent., this relative decline being compensated by a great advance in the import from India (13·9 per cent.), Russia (13·5 per cent.), and Australasia (6·4 per cent.). In the case of the United States the decline was absolute—from an average of about 57 to one of about 42 million cwts. (37·9 per cent. of total). The import from Canada in 1901–5 showed a rise to 9·4 per cent. of the total, and accordingly a considerably greater absolute increase; but it should be mentioned that the import of flour (though not of wheat) from Canada is in excess of the amount consigned thence. (See p. 602.) The amount of wheat meal and flour stated to be imported from Canada in 1905 was 1·33 million cwts. against 0·96 consigned, in 1906 1·31 against 1·47. The proportion of wheat and flour imported from the Argentine Republic increased in 1901-5 to 13·1 per cent.

the corresponding decline in the supplies from the Old World. In the last lustrum of the century, the United States, British North America, and Argentina furnished more than three-fourths of the total supply. In Argentina, which first appeared in the British import tables as a source of wheat in 1883, the expansion has been due to the opening up of a new region of virgin soil as described in pars. **931** and **931***a*. In the United States and British North America, where the conditions of wheat production are very similar, we see in the period referred to a more striking illustration than ever before of the triumph of modern methods of production, handling, and transport.

147. In both these countries, the chief circumstance favouring the cheap production of wheat and other grain crops is the vast extent of arable land relatively to the number of the inhabitants, and the consequent **cheapness of the land**. One result of this cheapness of the land is that the **average size of farms** in the United States is considerable (in 1890, 137 acres [1]), and that a large proportion of the farms belong to those who cultivate them.

148. In **India**, on the other hand, the chief circumstance favouring the cheap production of wheat is the **cheapness of labour**. The climate in those parts of India in which wheat cultivation is chiefly pursued and most rapidly extending, the North-West Provinces and the Punjab, is on the whole as favourable to the growth of wheat as in the United States, though in some parts irrigation is necessary in consequence of insufficient rainfall. Land, however, is dear; and though it is true that many of the wheat-growers own the land which they till, and some of them do not even pay land-tax to the Government (**733**), yet the effect of the dearness of the land is shown in the **small size of the average farm throughout India**, which is only about one twenty-seventh of the average size in the United States (**733, 147**).

149. But the table brings out another point of importance. Down to the period 1881–85 the wheat import from the United States came in a greater and greater proportion from the Pacific ports—that is, principally from **California**, **Oregon**, and **Washington** (**50**). Since then the Atlantic ports of the United States and those of British North America have been more successful. The greatest wheat-growing area of that continent is, in fact, one divided among the States of Minnesota and North Dakota and the Canadian province of Manitoba, all of which share in the rich valley of the **Red River of the North** (**875, 889***A*). It is a valley with a deep, black, finely-pulverised soil (**46**), rich in organic matter (in some samples 4·8 per cent.) and lying in a part of the continent where the ground every year receives the beneficial influences of snow and frost (**43**: compare, however, **858**).

150. In all these regions the conditions are peculiarly favourable

[1] Of which on an average 79 acres consisted of improved, 58 of unimproved, land. In 1900, 146 acres, of which 74 improved, 72 unimproved.

to wheat-growing. In some parts 30 bushels of wheat to the acre is said to be a common yield without manure, and there are said to be well-authenticated cases of even 70 bushels to the acre. So great are these advantages that they fully make up for the disadvantage of the long distance from the European market. In some cases wheat grown at a distance of 500 miles from the port of shipment has traversed before reaching its destination a route of more than 15,000 miles—that is to say, a length equal to about five-eighths of the circumference of the globe at the equator.

150*a*. With respect to the Red River region, as well as American methods of cultivating and handling grain generally, the following extracts from the article on Agriculture in the first supplementary volume of the last edition of the *Encyclopædia Britannica* will be found of interest:—

'The best illustrations of the great or "bonanza" wheat farms, as they are called, are found along the Red River of the North, where it flows between the States of North Dakota and Minnesota. . . . During the season of 1899 the product of hard spring wheat amounted to nearly 250,000,000 bushels, or two-fifths of the entire wheat product of the United States. Of this, Minnesota and the two Dakotas alone produced 200,000,000 bushels. . . .

150*b*. 'Let us assume the conditions prevailing upon a bonanza farm of 5,000 acres, and briefly describe the process of wheat production from the ploughing of the land to the delivery of the grain in the final market. These great wheat farms were established upon new lands sold directly to capitalists by the railroads. . . . The improvements made upon them consist of the cheap wooden dwellings for the managers, dormitories and dining-halls for the men, stables for the horses, and sheds and workshops for repairing machinery. Very little of the land is under fence. . . . After burning the old straw of the previous year . . . comes the ploughing. . . . The plough used has a 16-inch share, turns two furrows, and is drawn by five horses. Each plough covers about 250 acres in a season, travelling an average of 20 miles a day. The ploughing begins in October, and continues a month or six weeks, according to the season. . . . Experience shows that it costs about 70 cents an acre to plough the land in this way. About forty men are employed upon a farm of 5,000 acres during the ploughing season. . . . At the end of the ploughing season these particular men are usually discharged, Only eight or ten are kept on a farm of this size throughout the year. The other men go back to their homes or to the factories in the cities, where they await the harvesting and threshing season. . . . When March comes the snows begin to melt away, and by April the ploughed land is dry enough for the harrow. The harrowing is done with 25-foot harrows, drawn by four horses, and operated by a single man. One man can harrow 60 to 75 acres a day

The seeding follows immediately with four-horse press drills that cover 12 feet. The harrows and drills are worked in "gangs" as the ploughs were. Each drill will go from 20 to 25 miles a day. When the weather is good the seeding upon a 5,000-acre farm will be done in 20 or 25 days. . . . The men who do the most important work are all temporary labourers. They come from the cities of the east or the farms of the south. They begin with the early harvest in Oklahoma, and work northwards up the Missouri and the Red River until the season closes in Manitoba. They are not tramps, but steady, industrious men, with few bad habits and few ambitions. On well-managed farms drinking and gambling are strictly forbidden. The work is hard, and, as there are few amusements of the farm, the men spend their resting periods in sleep. . . . The largest part of [their] food is brought from the eastern States. Some potatoes, turnips, and beans are grown upon the farms, but the corned beef, bacon, and groceries come from the cities. It is estimated that it costs 35 cents a day to feed each labourer. . . .

150*c*. 'The wheat farmers say that it does not pay to take undue care of old machinery, that more money is lost in repairing and tinkering an old machine than would pay for a new one. The result is that new machinery is bought in very large quantities, used until it is worn out or cannot be repaired without considerable work, and then left in the fields to rust. . . . The harvesters vary in size according to the character of the land. Upon the rougher ground and small farms the ordinary binders are used; upon the great plains, like those of California, a great harvester is used, which has a cutting line 52 feet wide. These machines cut, thresh, and stack the grain at the rate of 1,600 sacks a day, and cover an area in that time of 100 acres. These machines can only be used where the wheat ripens thoroughly standing in the field. . . .

150*d*. 'Every bonanza farmer's office is connected by wire with the markets at Minneapolis, Chicago, and Buffalo. Quotations arrive hourly in the selling season, and the superintendent keeps in close touch with his agents in the wheat-pits of these and other cities. When the instrument tells him of a good price, his agent is instructed to sell immediately. The farmer on the upper waters of the Red River of the North is kept fully informed as to the drought in India, the hot winds in the Argentine, and the floods of the Danube. . . .

150*e*. 'The great elevator centres are in Duluth, Minneapolis, and Buffalo. These elevators have a storage capacity of from 100,000 to 2,500,000 bushels. The new ones are built of steel, operated by steam or electricity, protected from fire by pneumatic water-pipes, and have complete machinery for drying and scouring the wheat whenever it is necessary. The elevators are provided with long spouts containing movable buckets, which can be lowered into the hold of a grain-laden vessel. The wheat is shovelled into the pathway of the huge

steam shovels, which draw it up to the ends of these spouts, where the buckets seize it and carry it upwards into the elevator, and distribute it among the various bins according to grade. A cargo of 200,000 bushels can thus be unloaded in two hours, while spouts on the other side of the elevator re-load into cars, five to ten at a time, filling a car in from five to ten minutes, or the largest canal-boat in an hour. The entire work of unloading, storing, and reloading adds only one cent. to the price of a bushel of wheat.' To this account it may be added that besides the great elevators there are multitudes of smaller ones. Every well-situated farm is within reach of more than one belonging to different owners, so that in selling his grain the cultivator can play off one against the other.

150*f*. 'The transportation of the wheat from the fields of the North-West to the seaport is a business of tremendous magnitude. Most of this wheat goes by way of the lakes through the Sault de Sainte Marie canal to Buffalo, where it is shipped by rail or inland canal to New York, Philadelphia, or Baltimore. Duluth, on Lake Superior, is, surprising to say, the second port in the United States in point of tonnage. . . . The greater lake vessels, called "whalebacks," carry cargoes up to 250,000 bushels. . . . The bushel of wheat, or an equivalent amount of flour, can be shipped from Minneapolis or Duluth to almost any point in western Europe for from 20 to 25 cents.'

151. It is the produce of these fertile regions, together with that of Argentina, which seems to have had the principal effect in lowering the price of wheat and driving that grain out of cultivation in the United Kingdom in the latter part of the nineteenth century. Now it is to be noted that, fertile as these regions are, they are bound sooner or later to meet the same fate as land similarly treated elsewhere in America has already undergone, namely, to become gradually less productive unless more expense is incurred in maintaining their fertility.

152. From the United States and British North America an increasing proportion of the wheat import is in the form of flour (**902**), and it is in that form that we get the bulk of the wheat import from Austria-Hungary. The **Hungarian** millers are, in fact, noted for the unsurpassed, if not unequalled, quality of their flour, due to the excellence of their wheat, the perfection of their machinery, and the elaborateness of their methods, but partly also, it would seem, to the dryness of the climate; for it has been found that, even from Hungarian wheat, flour of equal quality cannot be made in the moist climate of Great Britain by the same methods and machinery.

153. Besides the countries mentioned in the preceding table, wheat is imported into the United Kingdom from Chile, Egypt, Turkey, Roumania, and many others.

Being thus supplied with wheat from all parts of the world, both in the northern and southern hemispheres, the British Isles receive these supplies more or less all the year round,[1] the date of the arrival being dependent not only on the time necessary for transport, but also on the date of the harvest, which varies greatly in so many latitudes and climates. The following table, the particulars of which, except in the case of North America, are mainly derived from Scherzer, shows that there is not a month in the year in which a wheat harvest does not take place in some part of the world:—

Date of the Wheat Harvest in Various Countries.

January . . .	Australia, New Zealand, Argentine Republic, Chile.
February . . .	India.
March	India, Upper Egypt.
April.	Mexico, Cuba, Lower Egypt, Syria, Persia, Asia Minor.
May	Morocco, Algeria, and Tunis; the northern parts of Asia Minor, China, Japan, Texas, Florida.
June	The Mediterranean peninsulas and the south of France; California, Oregon, Utah, and the greater part of central and eastern United States territory south of 40°; Afghanistan, Japan.
July	France, Austria-Hungary, southern Russia, the northern parts of the United States of America, Ontario, and Quebec.
August	England, Belgium, the Netherlands and Germany; the eastern parts of the Dominion of Canada.
September. . .	Scotland, Sweden, Norway, Russia.
October . . .	Finland, northern Russia.
November . . .	Peru, South Africa.
December . . .	Burma, South Australia.

154. With regard to the total trade in wheat of other European countries than the United Kingdom, it is worthy of note that there are only five—Russia, Roumania, Austria-Hungary, Bulgaria, and Servia—which, according to recent statistics, exhibit an excess of exports over imports in this commodity; and among these, Russia's share amounts to about three-fourths of the whole. Not long ago France and Spain also exported in good years a considerable excess of wheat and wheat-flour, but both these countries are now to be reckoned among the countries that import more wheat than they export. A large part of the French import of wheat, like that of other Mediterranean countries, is now derived from India, the hard wheats of that country finding the readiest market in that region, since these yield the flour best adapted for the making of the tubular paste known as maccaroni and vermicelli, which are favourite forms of wheaten food in Italy and other Mediterranean countries.

155. Taken as a whole, Europe still produces much more wheat

[1] In 1901, for example, there were only two weeks (one in April and one in August) in which the import of wheat into the United Kingdom exceeded 2,000,000, and only five in which it fell below 1,000,000 cwts.

than any other continent, so far as can be ascertained from statistical data. According to the figures compiled by the late Mr. Neumann Spallart, the average production of all European countries, except Turkey, for the years 1883–84 was about 1,276 million bushels (60 per cent.), against about 885 million bushels (40 per cent.) for the aggregate production of the United States and British North America, India, Australasia, Egypt, Algiers, Chile, and Japan.[1]

156. MAIZE is the only grain-crop which was introduced into the Old World from the New, and it owes the name of Indian corn, by which it is frequently known in England, to the fact that it was the only cereal of importance cultivated by the American Indians before the discovery of that continent by Europeans. Being a very productive crop—for it yields, under equally favourable conditions, fully twice as much grain to the acre as wheat—its cultivation spread very rapidly in the tropical and some of the warm temperate parts of the Old World when it became known there, but apparently much more rapidly in Africa, and even in the east of Asia, than in Europe; the reason of this, no doubt, being that the countries which were at that time most advanced in agriculture and industry were those in which the climate is least suitable for its cultivation.

157. Among other countries from which the cultivation of maize is excluded by the character of the climate is England, where the summer is not sufficiently long, warm, and sunny. The ideal climate for this grain is 'one with a summer 4½ to 7 months long, without frost, the middle portion hot both day and night, sunny skies, sufficient rains to supply the demands of a rapidly growing and luxuriant crop, falling at such intervals as to best provide sufficient moisture without ever making the soil actually wet.'[2] It is thus essentially a summer crop, and one that requires summer rains (or irrigation), though not very heavy and frequent rains. It is therefore unsuited to those countries which, like California, Chile, and most of those round the Mediterranean (**39***b*, **470**, **889***D*), though admirably adapted for the growth of wheat, are characterised by summers of remarkable dryness. It was this circumstance that seems chiefly to have caused the slow progress of its cultivation in Europe (except Portugal), although it was gradually found to be very well adapted to the central parts of that continent, including northern Italy, and above all to the eastern parts (Roumania, with the adjacent parts of Russia), where the greater part of the rainfall of the year occurs in summer, and where the summers are at the same time remarkably sunny. The same characteristics render the climate of the greater part of the United States eminently suited to this crop, which is, in fact, the principal corn-crop of the

[1] According to the *United States Year Book of Agriculture*, 1909, the world's wheat-crop in 1907 was 3,145 million bushels (of 60 lbs.), of which 1,621 millions (52 per cent.) were produced in Europe, 1,524 millions (48 per cent.) elsewhere.

[2] Tenth Census of United States: Statistics of Agriculture, Cereals, p. 92.

country; so that when a native of the United States speaks of 'corn' simply, it is always maize that he means, just as an Englishman means by the same word wheat. In the Commonwealth of Australia maize is the most important grain-crop in Queensland, and in New South Wales it ranks next after wheat.

158. The quantity and value of the maize imported into the United Kingdom (chiefly for the feeding of horses and cattle) are next to those of wheat among grain-crops. More than half the entire import is usually derived from the United States and British North America; but **Roumania**, which, above all other countries in Europe, devotes itself to this crop, is supplying an increasing proportion, generally from one-fourth to one-third of the whole. Other countries from which it is imported in considerable quantity are Russia, Turkey, and Egypt.

159. In the **British Isles** maize is used **as human food** only to a very limited extent, and chiefly in the form of the so-called 'corn-flour'; but in many of the countries in which it forms a staple crop it is used in this way much more largely and in various forms. In the **United States** the heads of green (unripe) maize form a favourite vegetable, the grains being eaten like peas in this country along with meat, and a preparation known as hominy—a kind of pudding made from coarsely ground maize meal—is much liked. In **Mexico** maize is still, as it always has been, the principal food of the people, being coarsely ground at home and made into a kind of cakes called **tortillas**, which are eaten warm. The **polenta**, which forms a chief part of the food of the inhabitants of **Italy**, except in the extreme south, is generally made from maize-meal; and so too is the **mamaliga** of the **Roumanians**. In **Transcaucasia** the heads of maize are cooked under the name of **kukurus**. Various kinds of beer and spirits are also made from maize, which is now used to some extent even by English beer-brewers.

160. **OATS.** This crop can be cultivated with advantage over a wider range in latitude and on a greater variety of soils than wheat; but the climate best suited to it is one that is moister and has cooler summers than that best adapted for the latter crop. Such climates produce grain of better quality for all the purposes for which oats are grown, and, moreover, produce a much greater weight of grain per bushel, the variations in this respect being much greater than in the case of wheat. Whereas wheat does not often weigh much more or much less than 60 lbs. per bushel, oats grown in one place may weigh 50 lbs., in another place only 26 lbs. per bushel. This circumstance is all the more important since there are also great variations in the amount of meal yielded by oats, only the best qualities yielding as much as half their weight. Oats are consequently **grown chiefly in the more northerly and moister parts of Europe**; but still, being more easily grown than wheat, the quantity of oats produced exceeds that of wheat in almost all European countries, except those bordering on the

Mediterranean, the dry and warm summers of which are wholly unsuited to this crop. This crop is by far the most important in Scotland, Ireland, Denmark, and Scandinavia. Even Germany, Switzerland, and Russia produce more than twice as much oats as wheat; and in Belgium and Austria-Hungary the quantity of each is nearly equal. Taking the United Kingdom as a whole, we find that oats form the only corn-crop which occupied on the average about as great an area in 1896–1900 as it did in 1871–75. This is chiefly due to the fact that an extension of its cultivation in England, in consequence of the extreme depression in wheat, compensated a great decrease in the extent of this crop in Ireland. Among British possessions, oats form the chief cereal crop in Canada and New Zealand.

161. In those countries in which this grain is chiefly grown, it generally forms a large part of the food of the people. In Scotland it constituted, in the shape of oatmeal porridge, oak-cakes, and other forms, the chief food of the people as late as the end of the eighteenth century; but it is mainly as provender for horses that oats are grown, this grain being proved by experience to be the best for that purpose. In ancient times the grain was not much grown—no doubt in consequence of its unsuitableness for the climate of the countries round the Mediterranean, where the civilised nations of antiquity had their seats. It is not mentioned in the Bible, but it was cultivated in a small way in Italy, as food for horses, as early as the beginning of the Christian era. In central Europe, nevertheless, it was a grain of much greater antiquity, for it is found among the remains of the Lake-dwellings of Switzerland, but not, according to Prof. Heer, among remains of as great age as some of those which include grains of wheat.

The total quantity of oats imported into the United Kingdom is on the average less than a fifth of the total quantity of wheat and flour. The countries from which it is chiefly derived are Russia, Sweden, Germany, Holland, and British North America, Russia alone supplying the greater part.

162. **BARLEY.** This is in several respects a highly remarkable crop. By some writers it is believed to be the most ancient of cultivated grains. Several varieties of it (including two of that kind which is known in England as **bere** or **bigg**, having six instead of two rows of grain in the ear) have been found among the remains of the Lake-dwellings of Switzerland. **Its range in climate is wider than that of any other cereal,** cultivation having led to the development of some coarse varieties which ripen their grain within a shorter period than the hardiest varieties of oats. Hence, of all cereals it is that which reaches farthest north in latitude, and highest up on mountain slopes. In Norway it is cultivated even in 70° N. On the other hand, it flourishes well in any soil and under any climate that is suited for wheat, and it is in such climates that the best barley is grown. Thus it happens that it is the associate of oats in the northern countries of

Europe, which are on the whole too cold for wheat, and the associate of wheat in the southern countries of Europe and the other countries round the Mediterranean, which are too dry in summer for maize, but where the barley, like the wheat, is of excellent quality. In the United States the state that grows the largest proportion of barley is California, which, like the Mediterranean countries, has a climate unsuited both for maize (except on irrigated land) and for oats.

163. Barley appears to have been the **chief bread-plant of the ancient Hebrews, Greeks, and Romans**, no doubt because it was the most productive of the grains suited to the Mediterranean climate, for the quantity of grain which it produces to the acre is much greater than that of wheat (in England about one-fourth greater). Barley-bread was once common in Scotland, where it is still used to some extent, and it is likewise pretty largely eaten in Scandinavia; but nowadays barley is principally grown for the sake of the beer made from malt, that is, from barley-grain which has been allowed to sprout and then been killed. It is for this purpose that it is so largely grown in England; and for the same reason it is a very important crop in Germany (where the quantity produced annually is on an average almost equal to that of wheat), and in the state of New York in the United States. In Scotland and Ireland it is chiefly used in the making of whisky.

The quantity of barley imported into the United Kingdom is on the average about the same as that of oats, the countries from which it is chiefly derived being Russia (which generally supplies at least two-fifths of the whole), Roumania, Turkey (including Asia Minor, which is noted for the quality of its barley), and Algeria.

164. **RYE.** This is the least familiar of all the grain-crops grown in Great Britain at all, but there is probably no other cereal except wheat that is **cultivated so largely on the mainland of Europe as a bread-plant.** Its great recommendation is that of all the bread-plants it flourishes on the poorest soil and in the most inhospitable climates, where, indeed, it thrives best. It is hence a great boon to the vast tract stretching from Holland, through northern Germany, into central Russia, which is mainly covered by a poor, sandy soil. Throughout that region, as well as in Switzerland, Denmark, and southern Scandinavia, it is the prevailing bread-plant. In Russia and in Switzerland it is more abundantly produced than any other grain whatever, and even in the Austrian provinces outside of Hungary there is more rye grown than wheat. In the United Kingdom only a very small fraction of the arable surface is occupied by it. In the United States the use of the grain in the making of bread is diminishing, the straw, which is largely used for packing and making certain kinds of paper and pasteboard, being there regarded in many places as the most valuable part of the crop. Formerly, however, it was otherwise (888). Rye is imported into Great Britain only in very small quantity, and almost entirely from the Continent of Europe.

165. BUCKWHEAT. This is a grain-crop unknown to the agriculture of the United Kingdom, but ranking next in extent of cultivation after those already mentioned, both in Europe generally and in the United States and British North America. It does not belong, like most of the grain-crops, including all those already mentioned, to the great family of the grasses, but is an ally of some of our common weeds, such as snake-weed and persicaria, and a more distant ally of the common dock or sorrel. It is a native of eastern Asia, and was introduced into Europe only at a late period. Its French name, *sarrasin*, appears to indicate that in that country it first became known through the Saracens or Arabs. The grain is said to be very nutritious, and the crop has these recommendations, that it can be grown with hardly any cultivation on the poorest soils, especially, like rye, on very light, sandy soils, and that its sowing-time is late (in the United States from May to the middle of August), which often allows of its being sown to replace another crop that has failed. But against these advantages there are to be placed the great disadvantages that its yield is very uncertain, and that the very ease with which it can be grown encourages slovenly habits of cultivation. The only countries in Europe in which there is a considerable extent of ground under this crop are Russia and France. These two countries supply the bulk of the small British import.

166. PULSES. This is a general term rather vaguely used for certain pod-fruits—that is, fruits (in the botanical sense of that word) having large seeds enclosed in a long seed-vessel, the most familiar examples being peas and beans. The vegetable forms which have this kind of fruit are extremely numerous, and comprise lofty trees as well as tender plants; but the term pulse is confined to such as supply seeds or pods capable of being used for food by men or cattle. For the most part, the pulses of commerce are derived from green plants often weak-stemmed, but we may include under this head the fruit of two trees, the carob, or locust, and the mezquite.

167. The chief pulses of commerce are common peas and beans, chick-peas, and soya-beans. **Peas** are those suited to the coldest climate, and are largely cultivated everywhere in the less warm parts of the temperate zone, though not confined to these parts. They are largely imported into Great Britain, chiefly from British North America and the United States, the former region, which is the more northerly, supplying by much the greater share. Many varieties of the common **bean** (*Phaseolus vulgaris*, Linn.) are cultivated, some suited to one climate, some to another; some grown solely as food for horses and cattle, others eaten by man. The largest imports of beans into this country are from the warmer parts of the temperate zone, especially from Egypt and other Mediterranean countries. Egypt alone always supplies more than half the whole import into the United Kingdom. The average acreage under beans and peas in the United

Kingdom in the period 1881–85 showed in each case a decline of more than 100,000 acres as compared with the period 1871–75, and since then there has been a further decline in both. **Chick-peas** (*Cicer arietinum*, Linn.) are not of sufficient importance in the commerce of Great Britain to be separately entered in the 'Annual Statements of Trade,' but they are an important product and article of trade in southern Europe and northern Africa, and also in India, where the crop is known as gram. In Spain they are one of the chief articles of diet of the people, and from Spain they are exported in large quantity to Cuba and elsewhere. In the caravan trade of northern Africa they have an important place, and, besides forming an important article of local trade and consumption in India, they are exported thence also, chiefly to Mauritius and Ceylon. In warm countries, where butcher-meat is little consumed, this and other pulses are in fact an almost essential part of the regular diet, since they supply elements of food not contained in sufficient quantity in grain and fruits. It is for this reason that **soya-beans** are largely consumed in two other warm countries, China and Japan, as well as in India. According to Decandolle this bean is indigenous in Cochin-China, Java, and Japan. It is now very extensively cultivated throughout eastern Asia, and is made (along with other pulses) into a great variety of preparations for use as human food. **Soya**, an extract from soya-beans, is also exported to Europe, and especially to England, to be used as an ingredient in soups and sauces, but much of the so-called soya is manufactured in Europe itself from various mushrooms. Oil can also be expressed from the beans, and in some parts of central Europe the cultivation of this bean as food for cattle has been tried.

168. Among other pulses of more or less importance in agriculture and commerce are **lentils**, **vetches**, and **lupines**, all of which are cultivated for their pods in southern Europe, and the Mediterranean region generally; lentils also in India. **Lentils** are celebrated for the nutritious character of their seeds, and the meal derived from them is the basis of the invalid food advertised under the names of *Ervalenta* and *Revalenta arabica*. In central and western Europe vetches and lupines are cultivated solely for use as green fodder, lupines being a crop of special importance in certain localities, from its being adapted to very light, sandy soils.

169. The long flat dried pod of the **carob-tree** sold in our shops under the name of **locusts**, and sometimes called St. John's Bread, from the fact of its being supposed by some to be the locusts stated in the New Testament to have been eaten by John the Baptist in the wilderness, is the fruit of a tree (*Ceratonia siliqua*, Linn.) belonging to the Mediterranean generally, but specially abundant on the island of Cyprus. The pods have now become a very considerable article of export from that island, and are largely sent to England to be used for cattle-fodder. So rich are the Cyprus carob-pods in sugar that a

sweet juice can be extracted from them capable of being used in preserving fruits, as well as for the other purposes to which sugar is applied. **Mezquite** is the name of several species of American trees of the genus Prosopis, producing a sweet pod something like that of the carob-tree. The most widely distributed species (*Prosopis dulcis*, Kunth), to which the Spaniards gave the name of the carob (**algarrobo**), after the similar tree of their own country, has pods nearly or quite two feet in length; but this is rather a tropical tree than a tree of the temperate zone. The species to which the name mezquite is given in North America (*P. juliflora*, DC., and *P. pubescens*, Benth.) have smaller pods, which, as well as the beans contained in them, are much relished by cattle. They are abundant in the north of Mexico and in the United States from Texas to California, and are spreading with great rapidity in western Texas, especially since forest fires have become less frequent.

170. POTATO. This important plant is one of the gifts of the New World to the Old. The cultivated species, which is known to botanists as *Solanum tuberosum*, Linn., and is hence a member of the same genus as our common weeds the woody nightshade and the bittersweet, is a native of the high and dry regions of the Andes from Chile to Venezuela, and its introduction thence into other countries has proved of immense importance on account of its extreme productiveness, its easy cultivation, and its remarkable powers of acclimatisation, varieties of this plant being capable of cultivation from the tropics to the farthest limits of agriculture, even beyond the polar limit of barley. There is much uncertainty as to the date of its introduction into Europe, and into particular European countries. It is believed to have been known in Spain in the first half of the sixteenth century, but Italy is said to have been the country into which it was first introduced (about 1560), and it was certainly cultivated in that country before 1600. It is commonly said to have been introduced into Ireland by Sir Walter Raleigh from Virginia in 1586, but this statement is certainly not accurate as it stands. It is certain that it was not Sir Walter Raleigh that introduced any plant from Virginia about that time, though colonists originally settled in America by Sir Walter Raleigh may have done so; but it is not at all certain that the potato was the plant then introduced—and, even if it was, it is not to be inferred that the potato was originally a native of Virginia. It is certain, too, that the plant first known in England as the potato was not that which is now so called, but the batatas or sweet potato.

171. Whatever may be the truth as to the date of introduction, we know that it was long before the potato rose into favour as an object of agriculture in most European countries. In Ireland it was earlier cultivated than in Great Britain. In England its cultivation did not become general till the eighteenth century, and it was only in the latter half of that century that it came to be widely cultivated in Germany

(where its cultivation is now more widespread than in any other country on the European mainland), as well as in France, Austria, and Hungary. It even required the exercise of the autocratic powers of Frederick II. of Prussia to effect its introduction into the sandy districts of Pomerania and Silesia. In north Germany the potato is said now to make up five-sevenths of the food of the working-classes, as it is known also to be the staple article of diet with the peasantry of Ireland. **The highest production per head is that of Ireland**, equal on an average to rather more than half a ton (·55 of a ton for the period 1879-88), and in this respect Germany comes next with an average production of rather less than half a ton per head.[1]

172. Owing to the great bulk of this commodity compared with its value, the foreign trade in it is carried on mainly, if not solely, with neighbouring countries. The greater part of the import into the United Kingdom is from the Channel Islands, France, and Germany; the total value in 1900 more than 2,000,000*l.* sterling. In that year the Channel Islands, where the cultivation of early potatoes is rapidly increasing—above all, in Jersey, which is already almost one large potato-field—supplied nearly two-fifths of the whole import in quantity, and more than half the value. Egypt is the most distant locality the import from which is mentioned in the 'Annual Statements.'

173. One great objection to the cultivation of the potato, it may here be mentioned, is its **liability to disease**, which in some years, as in 1845-46 in Ireland, has caused great distress in those countries which depend mainly on this root. It has been suggested as a remedy for this evil to introduce the cultivation of other species of potato (*Solanum*), which might prove better suited to the moist climate of western Europe than that which is a native of the dry regions of the Andes. Two species in particular have been recommended for that purpose, and have been more or less successfully subjected to experiment with the view of testing their suitability, both for separate cultivation and for crossing with the ordinary potato. One of these is *S. maglia*, Schlecht, a native of the moister parts of Chile as far as 44° or 45° S.; and the other *S. commersoni*, Duval, a native of Uruguay and the Argentine Republic, where it grows in rocky situations at a low level.

174. ONIONS are the only other vegetable the import of which into the United Kingdom is considerable enough to be separately entered in the 'Annual Statements.' They are largely imported from various European countries (above all, Holland), as well as from Egypt, &c. Other vegetables—turnips, mangold, carrots, and parsnips, &c.—are for the most part of too little value in proportion to their bulk to bear the expense of distant transport, and hence are chiefly produced at home, turnips alone occupying in the United Kingdom an area four-fifths as large again as that devoted to potatoes. The total value of the import

[1] In 1900, Germany 0·675, Ireland 0·61 of a ton per head.

into the United Kingdom under the general head of 'Vegetables' in 1887 was less than that of both potatoes and onions separately; and even with the addition of pickled vegetables (imported mainly from Holland, but probably to a large extent of other origin) less than that of potatoes.

175. FRUITS OF THE TEMPERATE ZONE, including nuts and edible seeds. Of all the familiar fruits suitable to a climate like that of England, the only one that enters so largely into the foreign commerce of the country as to be separately mentioned in the 'Annual Statements of British Trade' is the **apple**, which is largely imported from the continent of Europe, and still more largely from North America, including both the United States and the British possessions. Australasia has recently begun to contribute a portion of the supply. Notwithstanding the fact that there are nearly 200,000 acres in Great Britain[1] occupied by fruit-trees (chiefly apple-trees), the value of the import of apples is regularly more than half as great as the value of that of oranges. There is also a considerable import of plums and prunes from France.

176. But the bulk of the fruit-trade of the United Kingdom is in **southern fruits**—so called from the fact of their being imported into Great Britain and the countries of central and northern Europe chiefly from the peninsulas bordering on the Mediterranean. The principal fruits comprised under this designation are oranges and lemons, grapes, currants and raisins, figs, almonds and edible nuts, chiefly walnuts and chestnuts. Some of these products, like the orange and fig, reach their northern limit near the southern coasts of Europe, whereas others advance far into central Europe; but, in the case of the British Isles at least, the chief imports of all of them are from countries that border at some part on the Mediterranean, though most, if not all, of them seem to have been originally introduced into that region from other parts of the world.

176*a*. The orange (*Citrus aurantium*, Risso) is believed to be a native of China, where the tree is still cultivated with great care in the southern half of the empire. From China it had already spread to other parts of southern Asia before the discovery of the sea-way to that part of the world (**100**), and from some part of southern Asia it was introduced into Europe by the Portuguese in 1548. It is now cultivated in several varieties in a great many places in the tropical and sub-tropical parts of the whole earth, reaching its most northerly limit in Europe owing to the peculiarly favourable climate of the Mediterranean region (**468**). Its northern limit in North America extends in the west (in California) to about lat. 37° N., in the east to about 31½° N. In Europe its northern limit rises in western Portugal to about 40° N., and then, except in the valley of Andalusia, merely skirting

[1] The extent in Ireland is not stated in the 'Irish Agricultural Returns.'

the coast of the Iberian Peninsula, ascends to its highest, about 44° N., in the north-west of Italy. In Asia it begins in the west about lat. 37° (a degree and a half south of Smyrna), and sinks in the east to about 34°. In the southern hemisphere, the limit is about 35° S. The other species of the genus of commercial importance are the **lemon** (*C. limonum*, Risso), the smaller-fruited **lime** (*C. limetta*, Risso), and the large thick-rinded **citron** (*C. medica*, Risso). The last species was the first to be introduced into Europe (not long after the beginning of the Christian era), and owes its distinguishing name to the fact that it was known to the Romans as a tree abundant in Media (the tract on the south-east of the Caucasus). All the species appear to be native in India. Varieties of the citron ripen their fruit in Tirol to the north of 46°. A hardier species of the genus is the kumquat of Japan (*C. japonica*, Thunb.), which is grafted on a wild stock that remains uninjured by frost, and which is hence recommended for cultivation in those parts of the United States in which the ordinary orange could not be grown with success. It yields a small fruit resembling the orange in flavour, though slightly bitter.

176*b*. More than half the entire quantity of oranges and lemons imported into the United Kingdom is derived from Spain, Italy—and more particularly Sicily—ranking next as a place of origin. France derives a considerable share of her supplies from Algeria (especially Saida, south of Oran). The United States import oranges chiefly from the West Indies and South America (especially Brazil); but, in addition to the imported supply, produce large quantities of this fruit within their own borders (894). As regards quality, the Maltese, Jaffa, Azores (St. Michael), and West Indian oranges are the most celebrated, the last being considered by some to surpass those of all other places. In India the oranges of Nágpur and the Khási Hills have a high reputation, in the Argentine Republic those of Tucuman. **Limes** are grown for export, and for the making of lime-juice, more abundantly on the West Indian island of Montserrat than in any other place.

176*c*. **Figs** can be cultivated in the Mediterranean region over a somewhat wider range than the orange, the tree which produces this fruit not being so sensitive as the orange to frost; but as a matter of fact they are grown for export mainly in the eastern part of the Mediterranean, and above all in Asia Minor, in the district lying to the north of those to which the orange is confined. The **valley round Smyrna**, which carries on no orange cultivation, produces figs of peculiarly fine quality. Greece also produces excellent figs, both on the islands and the mainland; and so also does southern Italy. The necessity of cheap labour for packing the figs, which, as everybody knows, are exported almost exclusively as a dry fruit, is no doubt an obstacle to the cultivation of the fig, especially in those regions which are suitable also for the more valuable orange.

176*d*. **Grapes** are of course produced wherever the vine is grown

(179), but they are exported as a fruit chiefly from those districts which do not produce a grape suitable for wine-making. Large quantities of table-grapes are grown in this country, and elsewhere beyond the limit of regular vine-culture, in hot-houses or under glass. They are also imported from Spain (especially the south-east) and Portugal, and to a small extent from other countries. **Raisins** and **currants** are dried grapes. Raisins are imported into this country chiefly from Spain and Asia Minor, all other countries furnishing less than a tenth of the total British supply. (See also **894, 956.**) **Sultana raisins** are made from a seedless grape largely cultivated in Asia Minor and on some of the adjacent islands. **Currants** are the dried form of a still smaller seedless grape obtained from a variety of vine which appears to be one of the most exacting of all plants as regards soil and climate, and one that exhibits in the most marked manner the effect of local influences. The currant-vine is almost confined to the kingdom of Greece, and its product is the most valuable of all the exports of that kingdom. But even in Greece its domain is limited, and it is observed that, however carefully the vine may be cultivated, it is impossible to get an equally good fruit in all the different districts in which it is grown. The smallest, but sweetest and best flavoured currants are grown on the islands, and on the mainland it is observed that the best qualities are grown only at the head and on the south shore of the Gulf of Corinth. It was on this gulf, in the neighbourhood of the town of Corinth, of which the name currant is a corruption, that this variety of the vine was first cultivated on the Greek mainland.

176e. Almonds, walnuts, and **chestnuts**—all, it would appear, originally products of the interior of Asia Minor, in the neighbourhood of the Black Sea—have all spread far west, and more or less north. Almonds are now chiefly imported from Italy, Morocco, and Spain, but are also produced in considerable quantity in France; and walnuts and chestnuts have penetrated much farther into the heart of Europe. These last two are not separately entered in the 'Annual Statements,' but they make up a large part of the unenumerated nuts used as fruit which are imported into this country chiefly from Spain and France. Among other southern fruits more or less important in commerce are the **prickly pear,** the black-spotted pear-shaped fruit of a cactus, introduced into southern Europe from the drier parts of tropical America; the **black mulberry,** the **pomegranate,** and the **pistachio nut.** With regard to several of the fruits here spoken of, it may be mentioned that the foreign trade connected with them represents only a very small portion of the whole trade to which they give rise, seeing that in the countries in which they are grown, some of them, such as oranges, grapes, prickly pears, and figs, are not mere luxuries, as they are with northern peoples, but make up an essential and important part of the food of the people, and thus are the staples of a very large local trade both by sea and land.

177. WINE. From a geographical point of view, and more particularly, as will appear further on, from the standpoint of commercial geography, the vine is one of the most interesting of all economic plants. Its original home seems to have been somewhere in western Asia or the south-east of Europe. According to Hehn, the region from which it spread is the luxuriant country to the south of the Caspian Sea, part of the ancient Media. 'There in the woods the vine, thick as a man's arm, still climbs into the loftiest trees, hanging in wreaths from summit to summit.'[1] But it appears to be indigenous as far east as Afghanistan and as far west as the Carpathians.[2]

178. How early the must, or juice of the grape, was converted into wine we know from the Hebrew Scriptures; and the virtues of this product in process of time caused the spread of vine-culture wherever civilisation advanced along the shores of the Mediterranean, as well as eastwards through the drier parts of Asia. By Europeans the vine of the Old World was introduced into America, where, however, there are native species (*Vitis labrusca*, L., &c.), now cultivated as wine-plants. The spread of vine-cultivation is still going on, and the vine thus rapidly extending over the whole domain suitable to it throughout the world.

179. The limits set to its cultivation by climate are somewhat rigorous; for though there are many varieties of the vine, as of all cultivated plants, there are none adapted—like some varieties of maize, for example—to a comparatively short summer. A moderately high temperature, extending far into the autumn, is essential to the maturing of the grape, so as to make it fit for wine-making. In Europe, a mean temperature of about 60° Fahr. in the month of September is one of the conditions of successful cultivation; and it is this fact chiefly which explains the form which the northern limit of the vine as a wine-plant assumes both in the Old World and the New. In western Europe, where the temperature is subject to moderating influences both in summer and winter (35*a*), the northern limit is in about 47½° N., a little to the north of the mouth of the Loire, but it gradually rises eastwards as the summers get warmer, until in the east of Prussia, in the province of Posen, it reaches its highest latitude anywhere in the world, about 52½ or 53° N. As we go still further east the summer in equal latitudes gets shorter though warmer, and hence the September temperature declines. Consequently, the wine-limit gradually sinks to the shore of the Sea of Azof, where it is lower than in the west of France. The extremely sunny character of south-eastern Russia causes it, however, once more to rise a degree or two, but it again sinks in Asia to about 40° or 41°. The corresponding limit on the American continent has a similar form, but exhibits the advantage belonging to

[1] Hehn's *Wanderings of Plants and Animals*, p. 73 (Eng. ed.).

[2] Remains of vine-leaves have been found in prehistoric tuffs at Montpellier, and elsewhere in the south of France, and grape-pips round the Lake-dwellings of Switzerland, while fossil relics both of the vine and fig (*Ficus carica*) have been found in the Quaternary travertine of Miliana in Algeria.

Europe in respect of climate (36*a*). It begins in California about 37° N., rises to above 42° N. in the Canadian province of Ontario, but declines again slightly in the United States. In the southern hemisphere the limit is about 40° S.

180. But while the range of cultivation of the vine is thus limited on the north and south, it is important to observe that the habit of the plant gives it one great advantage within those limits. The roots of the vine-stock penetrate the soil to a great depth; and this fact, besides placing the roots beyond the reach of frost, which is important in those regions in which a summer of sufficient length is succeeded by a winter of great severity (as in some parts of Russia and central Asia), enables it to draw on deep stores of moisture, and thus without irrigation to flourish and to continue to produce its tender leaves, even in those parts of the Mediterranean in which the summers are nearly rainless and almost all other vegetation is then at a standstill (39*b*, 470).

181. Lastly, with respect to the range of the vine as a wine-plant, it is to be noted that the limits above described are not fixed solely by climate. They are fixed partly by commerce. They are not the limits within which the vine can grow and yield grapes whose juice can be made into wine, but the limits within which wine of tolerable quality can be produced—that is, wine sufficiently good to have a commercial value. In former times the vine was cultivated as a wine-plant in the valley of the Severn, and in several of the southern counties of England; and on the mainland of Europe, in the provinces of East and West Prussia, and even in Courland, in a higher latitude than it is now grown; but the yield in such places was very uncertain and the quality of the wine inferior, so that the cultivation of the vine was abandoned there when the advance of commerce cheapened the wines obtainable from more favoured regions.

182. The amount and quality of the wine obtainable from grapes in different places vary greatly from different causes. In the first place, the fruit of the vine is greatly affected by differences in the soil and climate. A sunny climate without excess of rainfall is that which is best adapted to it, and hence it is often grown, especially in the more northerly districts, on hill-slopes exposed to the sun, the slope favouring the draining away of superfluous moisture. The excess of summer rains prevents the cultivation of the vine for wine-making in monsoon countries (39) such as India and China. The best soil for the vine is one both warm and retentive of moisture,—that is, one that retains enough moisture without being wet; and it is, no doubt, the combination of these characters that makes chalky and other limestone soils so suitable for viticulture. But, secondly, the preparation of wine of high quality from the must is an industry that demands great skill and many expensive appliances, and consequently is practised on a great scale only where the industry is of long standing, and where the state of industry is sufficiently advanced to afford the necessary

capital and labour. And, thirdly, **the vine is subject to many diseases**, some of which have at times committed such ravages in vineyards as greatly to reduce, and occasionally almost to extinguish, the wine industry in certain districts. A **fungus** (*Oïdium Tuckeri*, Berk.) has since about the middle of the nineteenth century committed extensive ravages in the Mediterranean region, and almost destroyed the once famous vineyards of Madeira. Since about 1868 the vines of France and many other countries have suffered even more severely from an insect enemy—the now well-known phylloxera. In France alone upwards of a million acres of vineyards were reported to be infected by the disease due to this insect in 1885, and more than 2,000,000 acres had already been destroyed. Numerous vineyards have been replanted with American vines, not so liable to the attacks of the insect. The maximum area under the vine in France was that of 1875—about 5,980,000 acres. In 1902 it had fallen to about 4,834,000 acres, but at the latter date the vines were stronger, and in normal years much more productive relatively to area than at the height of the phylloxera ravages (about 1890).

183. The table below will serve to indicate roughly the relative place of different wine-producing countries, and the changes that have taken place in recent years. It must be remembered, however, that vintages are very variable, in consequence of variations in the weather, as well as the attacks of the pests above named. In France, for example, the yield varies between extremes of about 100 and above 800 gallons per acre. In the first column of the table below the figures given for France are the average of the ten years 1876–85, but the production in 1875 was more than twice that average.

Average Annual Wine Production.

	Million galls. About 1880.	Million galls. 1901–1905.		Million galls. About 1880.	Million galls. 1901–1905.		Million galls. About 1880.	Million galls. 1901–1905.
France	940	1,126	Germany	80	74	Switzerland	27	26*
Italy	600	840	Russia	40	?	Algeria	8	136
Spain	485	390	Roumania	25	28	Cape Colony	4	4*
Aust.-Hung.	160	179	Bulgaria	—	44	Australia	2	6
Portugal	90	105†	Greece	—	?	United States	24	31*

* 1901–4. † 1901–3.

184. France does not only take the first place as regards the quantity of its wine-production. Its most celebrated wines—such as the **clarets** or Bordeaux wines, from the best vineyards of the basin of the Gironde; **champagne**, grown on the chalk hills of the old province of that name; and **burgundy**, named from another old province—are among the best of all wines. The last-named is grown at its best on the 'golden' slopes of the Côte d'Or, where that range looks down on the warm valley of the Doubs, a valley sheltered from cold northern blasts by the Vosges Mountains and the heights of the Faucilles. France, as it has the largest wine-production in the world, has also the largest export trade in this commodity. Until the ravages of the

phylloxera began there was only a trifling import to set against this large export, but since 1880 the wine imported into France has exceeded in quantity the amount exported, and the amount of the import is now regularly between two and three times that of the export. There is not, however, the same difference in value, the imported wine being chiefly an inferior commodity from Italy and the north-east of Spain. The explanation of this large import is twofold. First, the fixed habits of the people lead to a larger consumption of wine per head in France than in any other country, and hence demand an increased import when the amount of the home product is diminished; and, secondly, France retains the reputation which it has long had in foreign countries, and especially in England, for its light wines, and hence imports a great deal of wine to re-export it as French, or to mix with wine of native production intended for export. Some of the wine now exported as French is even made from imported raisins and currants, or is an entirely artificial product.

185. Of the **wines of Italy**, though some were celebrated in classical times, only a few are in any favour abroad (670). Some of the **Spanish wines** have long been in high repute, especially in England, the most noted being those strong southern wines which take the name of **sherry** (formerly sherris) from the town of Jerez de la Frontera, near the seaport of Cadiz, in which district the best sherry is still produced, as it was in the days of Falstaff. A greater quantity of wine, however, is produced in the north-east of Spain, in the provinces of Barcelona, Zaragoza, &c. The wines of **Portugal** are chiefly grown in the basin of the Douro, and that which is exported is shipped at Oporto, chiefly for England, where it is known as port. Of the wines of the Austrian Empire the most celebrated are those of **Hungary**, grown chiefly on volcanic soil. Fine liqueur wines (sweet and syrupy) are a speciality of the Hungarian production. The celebrated Tokay of northern Hungary owes its reputation to the favourable soil of a particular range of hills, and to the care with which the juice of the grapes of these vineyards has long been treated. **Germany**, though only sixth on the list in respect of the quantity of wine which it produces, is noted for the fine quality of the vintage of some of its valleys, and above all, those of the warm valley of the middle Rhine, between the Vosges and the Black Forest, and the valleys of its tributary streams, the Moselle and the Neckar. The celebrated Taunus wine is grown on the slopes of the hills that shut in on the north the valley of the middle Rhine just mentioned.

186. In the **United States** the cultivation of the vine is far from having attained the extent that might have been expected from the vast area which they afford with a suitable climate; but this branch of agriculture is now receiving more attention, especially in California in the west and New York in the east. The light Californian wines are the only ones that have yet attained a reputation in this country.

In **Algeria** the spread of the vine-culture since 1878, when it was in its infancy, has been very rapid. The vine was introduced into the **Cape Colony** in 1653, soon after the arrival of the first European settlers, and it has been found to be very productive—according to a table given in the Handbook of the Colony, published in 1886, from two to four times as productive as in any other part of the world.[1] The quality of the grapes is also excellent, but few Cape wines are sufficiently carefully made to bear a high reputation in European markets. In order to raise the character of the wine industry of the colony, the Cape Government has bought one of the most celebrated vineyards of the colony (the Great Constantia vineyard, near Cape Town), with the view of making experiments and giving instruction in viticulture. The **Australian** production of wine is increasing, and several light wines of that origin have already found favour in the home market. Victoria, South Australia, and New South Wales are the chief states in which it is grown.

187. The **British trade in wine** is affected by the existence of a **customs duty** which varies according to the proportion of spirit contained in the wine. The countries from which the greater part of the British import is derived are France, Spain, and Portugal. A considerable proportion of the wine imported (about 8 per cent. on an average) is re-exported, being sent to all parts of the world. The quantity of wine retained for home **consumption** in the United Kingdom, relatively to population, steadily declined from ·56 gallon per head in 1876 to ·30 gallon per head[2] in 1886. For the sake of comparison it may be mentioned that in France the consumption in 1876 was rather more than 30 gallons per head; but that, it must be remembered, was the year after the unparalleled vintage of 1875. In the year following the rate was reduced to 28 gallons, and there has been a still further decline since.

188. **HOPS.** A slender-stemmed twining and climbing plant cultivated for the sake of its clusters of small greenish flowers, which are used as a seasoning for beer, to which they impart a bitter flavour. In cultivation it is allowed to twine round upright poles. There are two kinds of flowers on different plants, one which can and one which cannot produce seeds, and it is only the former that can be used for the purpose mentioned. The countries in which the plant is **most largely cultivated** are **England, Germany,** the **United States,** and **Austria.** England and Germany together always furnish more than half the total production of the world. On the average of the three years 1885–87 the share of England in the total yield was rather greater than that of Germany, on an acreage only about four-sevenths of the German acreage. Notwithstanding its large production, the United

[1] The statistics of the colony do not enable us to verify this, the acreage under vines not being returned.

[2] The minimum down to 1900 inclusive.

Kingdom regularly imports an amount equal to one-third of the home produce or more, the export being trifling. This fact might be expected to lead to still further increase in the extent of this crop, but the obstacle to any great extension consists in the fact that the **crop is a very exhausting one**, requiring to be grown only on the richest soil. It is hence confined to only a few localities. In England it is mainly grown in **Kent**, but the best quality is grown round Farnham, in **Surrey**, where the upper greensand, a geological formation very rich in mineral manures (**423·11**), comes to the surface. Besides Kent, the principal counties producing this crop are **Sussex**, **Hereford**, and **Hants**. It is not grown at all in the northern counties. Besides being grown only on rich soil, the crop is in England generally very plentifully treated with manure, so that the average quantity produced to the acre in this country is very much greater than the average produced anywhere else. The imported hops are mainly from the continent of Europe and the United States. In **Germany** hops are chiefly grown in Bavaria, and above all in the division of **Middle Franconia**, in the west of that kingdom, north of the Danube. Of late this crop has extended very rapidly in **Alsace-Lorraine**. In **Austria** the chief hop-growing province is **Bohemia**, where some districts are specially celebrated for the excellence of their produce. The hop as a cultivated plant was introduced into England from Belgium (Flanders) only in 1525.

189. BEET. The common name for several varieties of a species of plants called botanically *Beta vulgaris*, Linn., and largely cultivated. They have large broad leaves and long **tap-roots**, and it is principally for the sake of the latter that they have been introduced into agriculture. One variety is extensively grown in this country, under the German name of **mangold** or mangel-wurzel, as food for cattle, like the turnip. Requiring a hotter and drier climate than this latter crop, it is mostly grown in the southern and eastern parts of England, and, being very sensitive to frost, it is banished from those parts of the island in which the summers are short or the situation too exposed.

190. Another, and now a much more important variety, became in the course of the nineteenth century the great rival of the sugar-cane in the production of sugar. This variety is now cultivated over a very large and steadily increasing area in **central Europe, including the west and south-west of Russia**. Experiments have been made with its cultivation in the east of England, but this variety requires even a warmer climate than the last, and so far the success of these experiments has been limited. Beyond the confines of Europe the cultivation of sugar-beet has only recently begun to be successful. Under the protection of high duties sugar is now extracted and refined in the United States from beets grown in **California**, **Michigan**, and **New York**, as well as to some extent from irrigated fields in Utah and New

Mexico. Government encouragement is also being given to the industry with more or less promise of success in Victoria and New South Wales. See the Sugar Industry (**304–308**), and Introd. to eighth ed. par 49.

191. FLAX. Flax is a plant remarkable for the variety of useful products which it yields, as well as the variety of uses to which these products can be put, and hence is well called by botanists *Linum usitatissimum*, Linn. The most important of these products is the **fibre of the bast**, or inner bark of the stem, which is tall and slender like that of the cereals, but not unbranched. The fibre, which is from eight to upwards of fifty inches in length, is itself called **flax**, and from the earliest times has been spun and woven into a fabric known as **linen** (from the Latin name of the plant). Manufactured flax fibres have been found in the remains of the pre-historic Lake-dwellings of Switzerland. The oldest of all surviving vestments, the wrappings of the Egyptian mummies, are probably linen. The seed (**linseed**) is also of great value as yielding an oil largely used in mixing paints, and, in its greatest purity, in making varnish (**328**). The crushed cake that remains after pressing out the oil is an excellent food for cattle, and the seeds when ground afford the linseed-meal which is so much used medicinally. The **tow**, which is composed of the shorter fibres of the flax, those not used for weaving, is spun into twine and cords, and linen rags furnish the best material for paper-making.

192. Flax is grown through a **wide range of climate.** It thrives both in India and in the colder parts of Russia, but the chief commercial value of the crop arises only from one of its two products, either fibre or seed, not from both together. Where, as in India, the best seed (for oil) is grown, the fibre is nearly valueless; and where the fibre is good, as in Russia, the seed is of less value. In Europe flax is grown most extensively in **Russia**, from which more than three-fourths of the entire British import of the fibre is derived; and though it is also largely grown in all the countries of **central Europe** and in **northern Italy** (especially round Cremona), it is only in Russia that this branch of agriculture has of late years been extending. In Great Britain flax is now but little grown, but flax of excellent quality is still grown in large (though diminishing) amount in the north of **Ireland**, in the whole of which island it is a culture of great antiquity.

193. The soil best suited for the growth of flax for the fibre is one that is tolerably firm and moist. This latter circumstance is what renders the flat surface of Russia and Ireland so well suited for its growth. But there are other conditions besides soil and climate which have an important influence on the extent of flax cultivation. Flax is one of those crops which require the employment of a **good deal of labour on the field** before the fibre is ready for the factory. For the unprepared flax straw there is in England no market, and to be made ready for the market the flax has to undergo a number of processes which are apt to make extensive demands on the labour attached to a

farm at a time when it is much needed for other purposes. In the first place, instead of being cut like grain, flax has to be pulled up by the roots. Next it must be **rippled**—deprived of its seed-vessels by means of an iron comb. After that the straw has to be softened and otherwise altered in character by a process called **retting**. The straw has then to be **broken**, and afterwards to be **scutched**, or subjected to the action of a machine with revolving blades, which gets rid of the woody core of the fibre. When scutched the flax fibre is at last ready for the market.

194. It is the labour required for these processes that chiefly prevents the cultivation of flax in England and Scotland; but in view of the fact that the plant is quite suited for our climate, that the average value of the import of flax-fibre, linseed, and oil-cake (chiefly from linseed) into the United Kingdom is about 8,000,000*l.*, and that other branches of agriculture are declining in this country, an effort is now being made to extend the growth of flax among British farmers by making them acquainted with recently invented modes of saving labour in the operations above mentioned. It has likewise been suggested that facilities should be afforded to the growers for selling the flax in the straw as is done on the continent. In the **United States** flax is extensively cultivated, but almost exclusively for seed, the cost of labour for the preparatory processes being, no doubt, as in Great Britain, the chief cause preventing its cultivation for the fibre; for that country is one of the most important in the world for linen goods, and a linen manufacture, based on imported fibre, is developing there very rapidly.

195. Of the different flax products imported into the United Kingdom, that which has the greatest aggregate value is linseed; but the amount of flax fibre, including tow, annually imported is itself equal to the produce of 500,000 acres, or about ten times the acreage under this crop in Ireland. This betokens an extensive linen industry, the chief seats of which are in the same part of Ireland as that which produces the raw material. On the continent this industry is most highly developed in Germany (where Westphalia is most noted for the quality of its linens), Austria (especially Bohemia), and Belgium.

196. Lawns and **cambrics** are among the special fabrics made from flax. The latter is named from the French town of Cambrai, where the manufacture is still carried on. The canvas of sail-makers, formerly, as the name indicates (**197**), made from the hemp-fibre, is now, in the United Kingdom at least, made chiefly from flax.

197. HEMP (*Cannabis sativa*, Linn.) is a plant the **bast** of which yields a **fibre** similar to that of flax, only coarser and stronger. It is hence used chiefly (in England almost solely) for **ropes and cordage,** and the **fabric** woven from it, which takes the name of **canvas,** from

the Latin name of the plant, is principally used in making **sails**. The finer kinds of fibre are, however, used in making a cloth similar to linen, and hemp yarn, like linen yarn, is frequently combined with other yarns in weaving. Like flax, hemp is adapted to **a wide range of climate**; but the soil and climate best suited to it, when grown for the sake of the fibre, are similar to those required for flax, and the mode of cultivation and after-treatment of flax are likewise suitable in the case of hemp.

Hence the countries of chief production are the same. **Russia** stands first as regards quantity, but **Italy**, which comes second in quantity, has the reputation of producing the hemp of the finest quality (that grown round Bologna). In the United Kingdom hemp is even less grown than flax. In Ireland an inconsiderable quantity is produced, and in Great Britain its production is almost confined to the low alluvial lands of Lincolnshire, the clay flats of Holderness, and a few similar localities. In **India** hemp is very extensively grown, but chiefly for the sake of various stimulants derived from the plant (**744***a*).

198. The term 'hemp' is also applied to a number of other fibres, some tropical, some extra-tropical in their origin, adapted to the same uses as the true hemp fibre. By far the most important of these is that known as Manilla hemp, a tropical product (**317**), and among other tropical products so called are sunn-hemp, deccani-hemp (**319**), and sisal-hemp (**316**). Among plants belonging to temperate climates, the so-called **New Zealand flax** (*Phormium tenax*, Forst.) is now sometimes more appropriately called New Zealand hemp, seeing that the fibre is much better adapted to the purposes of hemp fibre than to those of flax fibre. In this case the fibre is derived from the leaves, which are long and narrow like those of the yellow flag or iris. The plant grows very abundantly in New Zealand and is very easily cultivated, and as the leaves can be cut thrice a year without destroying the plant, it might be expected that the supply of the fibre would be plentiful. But the use of the fibre in manufactures is impeded by the difficulty in freeing it from a gum by which it is invested. Hence, excellent as the fibre is when prepared, the total amount exported from New Zealand or used in native manufactures is quite insignificant compared with the corresponding amounts of hemp and Manilla hemp in the countries of their production.

199. Of other fibre-yielding products of the temperate zone, the most important are the **common nettle** (*Urtica dioica*, Linn.) and **esparto**. The bast fibres of the former were pretty extensively used in spinning and weaving on the continent of Europe before the great expansion of the cotton industry about the beginning of the nineteenth century (**254–56**), and their use has recently been revived to some extent in Germany and elsewhere. The cloth made from it is known as **grass-cloth**, in the making of which, however, the tropical or sub-

tropical fibres ramie and China-grass (318, 318*a*) are the materials principally employed. **Esparto**, or, as it is called in North Africa, **alfa**, is the commercial name of various grasses (chiefly *Stipa tenacissima*, Linn., but also *Lygeum spartum*, Loefl., and *Ampelodesma tenax*, Linn.), derived from northern Africa (Algeria and Tunis) and southern Spain, and used chiefly in paper-making (437, 440). In Spain esparto fibres are also employed in making ropes and cordage as well as in plaiting.

200. WOOL. Wool is the name given to a kind of hair found in greater or less quantity on almost all mammals, on a few of which it forms the principal covering of the body. From ordinary hair it is distinguished by two important properties. First, while a hair is almost quite smooth on the outside, each fibre in wool is covered with minute **overlapping scales**, the edges of which are turned in one direction like those of the slates on a roof. These scales are, however, extremely minute, so that they cannot be discerned by the naked eye or by the touch, unless a woollen fibre be drawn between the fingers in the direction opposite to that in which the edges of the scales are set. Second, each fibre of wool is finely **crimped** or **curled**, so that when drawn out it becomes greatly lengthened, returning again to its original length when the strain is removed. It is the spring due to this curl which imparts to woollen fabrics that **elasticity** which distinguishes them from those made from cotton, linen, and other fibres. Another distinguishing property of wool is its power of **felting**—that is, of becoming matted in such a manner as to be capable of being made into a kind of cloth without weaving, but merely by rolling, beating, and other processes.

201. The animal that furnishes by far the largest proportion of the wool of commerce is the domestic **sheep**, the woolly covering of which is almost entirely a product of domestication. Several different species of wild sheep are indeed known, one of these, the mouflon, still surviving in a few of the mountainous parts of southern Europe; and some of the species of wild sheep which inhabit the elevated regions of central Asia are known to produce, like other natives of the same part of the world, considerable quantities of winter wool. But no wild species of sheep possesses the well-known woolly fleece, which is one of the principal products for the sake of which the domestic sheep is reared. When the sheep was first domesticated it is impossible to say. This must have taken place at a period beyond the reach of history. The pictures on the ancient Egyptian monuments bear witness to the fact that the people of that country possessed the domestic sheep at a very remote period, though there are no pictures of this animal so old as some of those of the horse and ox.

202. In all countries suited for rearing it, the sheep is now the most numerous of domesticated animals, and in most of these it is

chiefly for the sake of the fleece that it is reared. The **climate** best adapted to the sheep as a wool-producer is one that is comparatively dry and equable, or at any rate free from extremes of cold. The grassy tracts of the Mediterranean countries are accordingly peculiarly favourable to it (**39*b*, 470**), and it was in that region that the **merino** sheep, the variety which now produces the finest wool in all parts of the world in which it thrives, originated. This variety, which is characterised by its dense and soft fleece, and fine but strong and very curly fibre, was **first known in northern Africa**, and was **thence introduced into Spain** about the middle of the fourteenth century. In Spain, which even in Roman times was renowned for the excellence of its fleeces, the variety was still further improved by careful rearing. In the seventeenth century the finest cloths of western Europe were all made from Spanish wool, and Spain retained its reputation for wool till long after that period. At the present day, however, Spanish wool, owing to the neglect which the sheep-rearing industry along with all others experienced for centuries in Spain, is far eclipsed by the produce of other countries, and in quantity it takes a very unimportant place in the commerce of the world.

203. The country which first bore the palm from Spain for its wool was **Saxony**, into which the merino sheep was introduced towards the middle of the eighteenth century. Upon the rearing of this variety the Saxon sheep-owners bestowed the greatest care, and in consequence of that care, rather than because of any superiority in climate, the so-called **'electoral'**[1] **wool**, rapidly attained the first place in the market. **Silesian wool**, produced in the Prussian province of Silesia, soon came to rival it from the same cause, and another rival is sometimes found in **Bohemian** (Austrian) **wool**. With regard to **English wool**, it must be explained that wools generally are classed in two great divisions (**214**), adapted for different purposes, the length of fibre or staple having been formerly the distinguishing character between the two, and it is mainly the long-stapled variety for which English wool has a reputation. The English breeds of sheep which take their names from the counties of Leicester and Lincoln are among the finest of the **'long-stapled'** class. To illustrate the effect of local conditions on the quality of sheep's wool, an effect which is very marked in many parts of the world, it may here be mentioned that, while these breeds produce in the counties named, and in Yorkshire and Notts, a highly lustrous wool, their fleece rapidly loses in brilliancy in other counties. In the middle ages wool was by far the most valuable of the English exports. It is still the principal agricultural export of the United Kingdom, and this export tends to increase greatly in absolute, and still more in relative, amount, as is shown by the following table :—

[1] So called because in the eighteenth century Saxony was an 'electorate'—that is, its ruler was one of the princes entitled to vote in the election of the emperor of the old German empire.

Period	British wool, average annual amount in millions of lbs.		Percentage exported
	Production	Export	
1871–75	159	9·44	5·9
1876–80	152	11·78	7·7
1881–85	133	17·79	13·4
1901–1905	134	33·29	24·8

204. The following table, giving an estimate[1] at different dates of the production of wool in different parts of the world, will serve to show where the tendency is upwards and where downwards, at least so far as the wool of international commerce is concerned:—

—	Production in millions of lbs.			
	1873	1879	1885	1900
United Kingdom	165	153	136	141
European Mainland	470	450	450	450
United States	175	233	330	301[3]
Australasia	193	289	385	514
River Plate[2]	248	226	356	398
Cape of Good Hope	49	51	50	46
Other sources (so far as received into Europe and N. America)	125	120	123	175
Total	1,425	1,522	1,830	2,025
Estimated *clean* wool after washing	827	861	993	1,125

205. The last line in the preceding table indicates a circumstance that greatly modifies the value of these figures for comparative purposes. The wool on the sheep always includes a varying proportion of grease and dirt, which must be removed before the wool is ready for use. Each fibre of the wool has a natural covering of grease, which is known as the **yolk**, and which on the living animal has the important property of preventing the wool from becoming felted. Occasionally the wool is scoured before export, but this practice, which is apt to result in the felting of the wool when packed in bales for long voyages, is becoming rarer. More frequently the fleece is washed to get rid of the dirt, the yolk being still retained. Very often, however, the wool is exported in its natural condition. The amount of clean wool, that is, the amount of fibre available for manufacturing purposes, thus varies greatly according to the difference of practice in this respect, as well as according to other circumstances affecting the condition of the wool. The following figures (based on the estimates of Messrs. Helmuth,

[1] For 1873, 1879, and 1885 by Mr. A. Sauerbeck, in the *Jour. Stat. Soc.* 1886, p. 608, for 1900 by Messrs. Helmuth, Schwartze & Co.

[2] Argentine Republic and Uruguay.

[3] North America.

Schwartze & Co.) consequently afford a more satisfactory comparison of the yield of wool in the three chief wool exporting regions of the world, or will at least serve to indicate the caution with which estimates of the production and consumption of wool in different countries must be received :—

Average Annual Imports of Wool into Europe and North America in millions of lbs.

From	—	1871–75	1876–80	1881–85	1896–1900
Australian Colonies.	raw	207	285	370	604
	clean	*116*	*145*	*182*	*311*
	=p.c.[1]	*55·7*	*50·9*	*49·2*	*51·4*
River Plate . . .	raw	226	243	306	480
	clean	*75*	*83*	*109*	*213*
	=p.c.	*33·3*	*34·1*	*35·5*	*44·4*
South Africa . . .	raw	52	50	53	83
	clean	*33*	*32*	*32*	*40*
	=p.c.	*63·7*	*64·1*	*60·6*	*48·2*

206. Merino sheep were introduced into Australia about the close of the eighteenth century, and care has been taken to propagate them. They have thriven admirably, and certain parts of Victoria and New South Wales now produce a wool unequalled for softness and lustre, and at the same time, unlike the original merino, very long in staple. This wool now commands the highest price in the London market. As the merino sheep, however, yields very poor mutton, the growth of the trade in frozen mutton has led to the rearing of increasing numbers of sheep crossed with English breeds, yielding better mutton, and producing a different variety of wool.

207. For the Australian and South African wool the principal market is the British Isles, which derive from the colonies of the southern hemisphere, and more recently also from Argentina, a steadily increasing proportion of the wool required for the home manufactures. The different branches of the British woollen industry now make use of more than three times as much imported as home-grown wool. Of the total quantity of imported wool (including that which is re-exported) that of Australasian origin increased from an average of 60 per cent. in the ten years 1866–75 to nearly 70 per cent. in the ten years 1891–1900.[2] As in Australia, large numbers of cross-bred sheep have come to be reared in recent years in Argentina. A great deal of the best blood of British breeds has been introduced into the country, and the cross-bred wool of that country is now unsurpassed. The chief markets for the River Plate wool are France, Belgium, and Germany.[3] This is partly, no doubt, because the United

[1] In the calculation of percentages fractions of millions are taken into account.

[2] In 1901–5, 64 per cent.

[3] In 1909 the Continent received 81 per cent., the United Kingdom and America each over 9 per cent. of the total.

Kingdom is so amply supplied by her own colonies; but it is partly due to the fact that the River Plate wool, from the nature of the pastures, contains a considerable admixture of foreign matter, so that it requires special machinery to deal with it. Such machinery has been more generally erected on the mainland of Europe than in the British Isles, and by means of it French and Belgian manufacturers spin yarns which are used to make soft all-wool fabrics of high quality.

207*a*. A few years ago London was almost the sole market for Australian wool, but in recent years wool markets have been established with great success in the chief Australian capitals. One result of this is that an increasing proportion of the wool from this part of the world is sent direct to Antwerp, Marseilles, Hamburg, and New York. Down to 1888 inclusive the largest number of bales of colonial wool sent direct to foreign ports was 94,000, or 5·8 per cent., of the total import into Europe and America.[1]

208. In the **United States the wool** is mostly of inferior quality, but efforts are now being made to improve it. The **Cape of Good Hope,** though not to be compared with the United States or the La Plata region as regards the total amount of wool produced, yields a large quantity relatively to population, and it, together with the other British possessions in South Africa, comes next after Australia in the amount of wool supplied to the British market. Several attempts were made to introduce fine-woolled sheep from Europe from about 1790 downwards, and about 1812 the rearing of merinos was fairly established in the colony. The South African wool is neither so fine nor so long in the staple as that of Australia.

Among the other countries from which the British Isles obtain supplies of wool the most important are India (whence the wool obtained is generally of poor quality, and used chiefly for making blankets), Russia, Germany, France, Holland and Belgium, Turkey, and Egypt.

209. The principal animals besides the sheep yielding materials for the woollen manufacture are the **goat,** the **alpaca** and **vicuña,** and the **camel.** The fibre derived from all of these is more nearly allied to wool than to hair, though there are gradual transitions between the properties of the one and those of the other fibre.

210. Of the varieties of goat, those most famous for their wool are the **Angora goat** and the Cashmere goat. The former is a native of the steppes of the **interior of Asia Minor,** and its wool, known as **mohair,** is remarkable for its length, fineness, softness, and silky appearance. The goat has been introduced with great success into

[1] In 1909 about 33 per cent. of the colonial wool clip was bought in London, either for the home trade or on foreign account; about 17 per cent. was imported direct from the colonial markets for consumption in the United Kingdom; about 37 per cent. imported direct to foreign ports; and about 13 per cent. despatched to foreign ports by way of England.

South Africa, and mohair has long been an important export of Cape Colony. The **Cashmere goat** is the animal that furnishes most of the material for the costly Cashmere shawls, so called from having been first made in the kingdom of Cashmere or Kashmir. The material used in the manufacture is not the ordinary covering of the goat, but a fine downy under-covering which grows in winter on this and other animals (such as the yak) belonging to the higher slopes of the Himalayas.

211. The **alpaca** is an animal closely allied to the llama, and, like it, a native of the lofty plateaux of the Andes. It has long been domesticated for the sake of its wool, which is remarkably soft and elastic. This wool, though long used in spinning and weaving by the Peruvians, was at first found to be unsuited for spinning by the processes now used in the great manufacturing countries; but the difficulties in the way of its being so used were at last (about 1836) overcome by Mr. (afterwards Sir Titus) Salt, of Bradford, who thereby founded an important industry.

The wool of the **vicuña**, another ally of the llama and alpaca, is of even more value than that of the latter animal, but, since the vicuña is found only at elevations above 13,000 feet, it is not domesticated, and the supply of wool from this source is consequently small.

212. Camel's hair, formerly used chiefly for making painters' brushes, is now employed in the manufacture of coarse shawls, carpets, and various other fabrics, the yarn made from it being usually mixed, however, with other yarns. A fine and light-coloured camel-hair is imported from China, a coarser and darker-coloured kind from Russia, and as this latter kind is very strong and does not readily stretch it is largely used in making belting for machinery.

213. WOOLLEN MANUFACTURES. In point of antiquity the origin of the spinning and weaving of wool belongs to the same remote period as the industry in cotton and linen. In point of extent the woollen industry is, in temperate countries at least, the great rival of the cotton industry, and in most of them is the more important of the two. In temperate and cold countries, in which close-fitting garments are worn, wool is much the most suitable material for clothing, not only because it is a bad conductor of heat, and woollen clothes consequently retain the heat better than others, but also because moisture is less readily absorbed by the woollen fibre, and perspiration more readily passes through woollen tissues than through tissues of another kind. Where, as in the tropics, and in warm countries generally, clothes are worn more loosely, this circumstance is of less consequence. It is natural, therefore, to find that in all temperate countries, except China and Japan (774*c*, 788), wool is the principal clothing material, and its use is further promoted by the fact that such countries also furnish the raw material of the manufacture.

214. The **treatment of wool** in manufactures is in many respects like that of cotton, but some differences require notice. First of all

the wool has to be thoroughly freed from the yolk or natural grease which invests it, since that would prevent it from taking the dyes, and otherwise interfere with the processes which it has to undergo. Dyeing may follow, and then the fibres may be oiled artificially to make them more easily workable. The nature of the next steps depends upon the use to which the wool is to be put, or more particularly upon the kind of yarn that is to be made from it. **Formerly all long-stapled wools (203)** were **combed**, or so treated that the fibres were laid as nearly as possible parallel to one another, and were then spun into a kind of yarn known as **worsted**, which is used in hosiery and in the manufacture of fabrics which have not to undergo the process of fulling. All **short-stapled wools**, on the other hand, were **carded** and spun much in the same way as cotton, and the yarns so made were the only ones capable of being used in making **milled or fulled cloths**, in which advantage is taken of the felting property in wool to thicken and shrink the cloth after weaving, and afterwards by means of teasels to raise the nap of the cloth in such a way that, in the most highly finished fabrics, a uniform surface is presented to view without any appearance of the intercrossing of fibres that takes place in weaving. All kinds of wool were therefore formerly divided into combing and carding or clothing wools, according to the purpose for which they were fitted. Machines have been invented capable of combing wools having a staple as short as one inch, and, on the other hand, wools with a staple of as much as five inches long may be used in making milled cloth. Wools are still divided into combing and carding or clothing wools, but the former term is no longer synonymous with long-stapled, the latter with short-stapled wools, and the distinction as between wools is no longer so absolute as it once was. But the distinction between **worsted yarns** and **carded or clothing yarns** still holds good, and it is to the industry concerned with the latter that the term 'woollen manufacture' is specially applied.

214a. Among the principal varieties of **woollen cloth in the special sense** of the term are: (1) **broadcloths**, so called from the great width of the web, the finest quality of cloth; (2) **cashmeres**, a fine thin twilled fabric, much used for ladies' dresses; (3) **tweeds**, a fabric of looser texture than broadcloth and less highly milled, first and still mostly made in Galashiels and other towns belonging to the Tweed basin, chiefly used for men's clothing; (4) **doeskin**, a strong twilled cloth also used for men's clothing. **Blankets, flannels, Scotch bonnets**, and some kinds of shawls also belong to the woollen manufacture in the narrower sense of the term.

215. The name **worsted** is said to be derived from the parish of Worstead in Norfolk, which may therefore be presumed to have been one of the places where the making of worsted was first practised. **Merinos** and **serges** are among the chief kinds of worsted fabrics made entirely of sheep's wool, but such fabrics are perhaps the exception

among those in which worsted yarn is used, at least in the United Kingdom, this kind of yarn being mixed more frequently than carded yarn with yarns made from other materials. The fibres chiefly used for mixing with that of the sheep are mohair, alpaca, and vicuña wool, and camel's hair. **Hosiery** and the making of carpets may also be classed as departments of the worsted branch of the woollen industry, though the best **carpets** (Turkey, Brussels, Axminster, &c.) are made on a ground of strong linen or hemp, and only inferior kinds (such as Kidderminster, Scotch, &c.) entirely of wool.

216. Besides woollen and worsted yarn another kind originally derived from wool is now employed in the woollen industry in the production of a coarse but cheap kind of woollen cloth. The raw material in this case is obtained by tearing up cast-off woollen clothing and woollen rags into fibres, which can be re-spun into a yarn, not very strong indeed, but capable of being woven. This material is known as **shoddy** when made from fragments of loose texture, and **mungo** when made from the remains of finer fragments, such as old dress-coats, tailors' clippings, and the like. This industry, besides using up all the available woollen rags of British production, has given rise in England to a large import trade in rags of this nature.

217. In the middle ages woollen manufactures attained their highest development in Flanders, which had the advantage of being within easy reach of abundant supplies of wool especially from England, and being able to send its manufactured products to the best markets by sea, river, and land. In the middle of the twelfth century **Flemish woollens** were already worn in France and Germany. A writer of the thirteenth century says that all the world was clothed in English wool wrought in Flanders. It was **from Flanders** that **English kings** at different times **introduced artisans into England** with the view of improving the woollen manufactures of that country. Towards the close of the eleventh century this was done by William the Conqueror; it was again done by Edward III. in the first half of the fourteenth century, and again by Henry VII. towards the close of the fifteenth.

218. England had already begun to export considerable quantities of woollen cloth in the sixteenth century, but the cloth was often, if not mostly, undressed and undyed, these finishing processes being performed in Holland as late as 1608, and for the finest fabrics down to the middle of that century. Early in the following century the woollen industry of England had risen to such importance that woollen manufactures formed upwards of 40 per cent. of the value of the exports, and about 1780 this industry is spoken of as having 'long been the glory of England and the envy of other nations.' Soon after that it began to share in the improvements brought about by the introduction of machinery into the cotton manufactures (254), but as the leading industrial countries of the world all form great markets for

woollen goods, the British woollen industry (in the wide sense of the term) never acquired the predominance attained by the British cotton manufactures.[1] In 1898 the factories engaged in woollen, worsted, and shoddy manufactures in the United Kingdom employed about 256,000 persons, or a little less than half the number employed in the various branches of the cotton industry. Nearly half of these were employed in the woollen (including shoddy), the remainder in worsted factories. It is noteworthy, however, that native English wools are best adapted for the worsted industry, which helps to account for the fact that it is in this branch that England has long maintained a special reputation, as is well shown by the character of our export trade in wool products.[2]

219. In certain parts of the European mainland it is now customary to have woollen yarns, as well as wool and woollen fabrics, 'conditioned'—that is, tested as to weight, measurement, and condition in recognised establishments for the purpose. The submission to this test is voluntary, but so general is the practice that at Roubaix (**540**), where there is one of the largest of these establishments, the amount of yarn conditioned increased from less than 200,000 lbs. in 1858 to about 68,000,000 lbs. in 1887. A similar establishment was opened at Bradford, Yorkshire, in 1891, and is provided with ingenious testing apparatus partly due to local invention.

220. SILK. Next to wool, silk is the most important of animal products used in weaving. The great bulk of the silk of commerce is derived from an animal called the **silkworm**, but which in reality is the caterpillar stage of a kind of moth, whose favourite and best food consists of the leaves of the white mulberry (*Morus alba*, L.). It is hence called *Bombyx mori*, or the mulberry bombyx. In the body of the silkworm the substance that becomes the silk fibre exists in the form of

[1] Compare Introduction to the Fourth Edition, pars. 17–19.

[2] The year 1862 was the first in which the British export of woollen yarns was distinguished from those of worsted and alpaca and mohair yarns; 1857 was the first in which woollen and worsted tissues exported were so distinguished.

British Exports in millions of lbs.

Average of years	Woollen yarn	Worsted yarn	Alpaca and mohair yarn
1862–66 . .	1·5	27·8	1·3
1901–05 . .	1·8	51·2	19·0

The export of combed wool made up into bundles known as tops increased from 6·4 million lbs. in 1890 to a maximum (down to 1907) of 42·5 in 1903.

British Exports in millions of yards of woollens and worsteds, exclusive of blankets, carpets, flannels, and druggets.

Average of years	Woollen tissues	Worsted tissues
1857–61 . . .	25	134
1896–1900 . . .	52	113
1901–05 . . .	56	103

The maximum export of the principal worsted tissues ('worsted stuffs, mixed and unmixed') was in 1872, when the excessive stimulus given to our textile industries by the interruption to continental industry due to the Franco-German war reached its culmination.

two jelly-like masses, which harden on exposure to the air. When the worm is about to pass into the still condition which answers to the chrysalis of a butterfly, it sends out this substance by two minute openings at its head, and the two streams, at once uniting, form an extremely fine thread, which the worm coils round it, so as to form what is called a **cocoon.** From the cocoons the silk of commerce is directly obtained, but the thread of a single cocoon is much too fine for use in spinning and weaving, and hence in reeling off the fibre the threads from several cocoons are united, individual threads being sufficiently adhesive to make this an easy matter. For the finest qualities of silk fibre, the product of from five to seven cocoons is used; for coarser qualities, the product of eleven or twelve, or even twenty or more.

221. After being reeled off from the cocoons the silk is made up into hanks, and in this condition forms the **raw silk** of commerce. The outer husks of the cocoon and a part of the silk in the interior are incapable of being reeled off, and in addition to that numerous fragments of thread remain as refuse after the process of reeling. These are exported from silk-producing countries under the names of **husks, knubs,** and **waste,** and such material is now largely employed in the manufacture of silk fabrics, especially in the United Kingdom. Cocoons also are exported, but generally in comparatively small quantity; for since 100 lbs. of cocoons yield only about 9 lbs. of raw silk, it is obvious that the carriage of the silk in the latter form must be much more economical than in the form of cocoons.

222. Since mulberry-leaves form the principal food of the **silkworm,** the animal can be **reared in all climates in which the mulberry thrives.** Silkworms are usually reared under cover, the trees being stripped of their leaves in order to supply them with food, and the animals can thus be protected from cold and other influences of the weather that might be injurious to them. The range of climate suitable for silkworm rearing is consequently a wide one. Still, the character of the climate is very important. The health and productiveness of the caterpillars is greatly affected by the temperature, and as the rearing of the insect from the egg to the formation of the cocoon is completed within seven weeks in spring, there are great fluctuations in the amount of raw silk produced, according as the weather is genial or not. In China the rearing of the 'worms' begins about the beginning of April, and the yield of silk is apt to be greatly diminished if during that month the temperature sinks much below 60° F. But the geographical distribution of raw silk production does not depend solely on climate. This industry is almost confined to the Old World, and indeed to Asia and Europe, notwithstanding that there are many regions elsewhere in which the climate is all that could be desired for the purpose. This limitation in the range of production arises from the nature of the labour connected with the industry. The tending of the silkworms previous to the spinning of the cocoons, and the subsequent operations

necessary to prepare the raw silk for the market, demand not only a considerable amount of labour, but likewise the utmost carefulness and delicacy on the part of those employed. Silk-rearing is therefore generally confined to those parts of the world in which the labourers are not only content with low wages, but have inherited from previous generations a capacity for watchfulness and delicate manipulation, and have been trained in these habits from a very early age.

223. In all probability it was in **China** that attention was first given to the rearing of silkworms, and that silk manufactures were first carried on, and it is that country in which the production of silk is still most extensive. Chinese history or legend ascribes to Si-ling-she, who is said to have lived about 2700 B.C., the honour of having discovered the art of spinning and weaving silk; for which discovery she has been canonised, and is still in China worshipped as a saint. The rearing of the silkworm is generally distributed over the empire, but it is principally carried on in the middle provinces (about latitude 30° to 35° N.), and in the southern province of Kwang-tung. In addition to the produce of the carefully reared and tended mulberry moth, there is a large amount of silk obtained in China (in all about one-fourth of the whole product) from various other moths, and from the mulberry moth in a state of nature. About one-fifth of the total export of silk from China is classed under the head of **wild and coarse silk.**

224. Next to China, the country which produces the largest amount of silk, both for home consumption and for export, is **Japan**, the export of which country is from one-third to one-half of that of China. The production of raw silk in Japan is subject to greater fluctuations than in China, a natural consequence of its more northerly latitude and greater liability to cold springs (222); yet on the average the amount of the silk export from Japan increased on the whole more rapidly than that from China. This may fairly be ascribed to the greater readiness of the Japanese to adopt European inventions, but it may be noted that the Chinese have at last been compelled to adopt steam filatures instead of continuing to reel all their silk by hand.[1]

225. In **India** the rearing of the mulberry silkworm appears to have been introduced as early as the sixth century of our era, but the industry is far from having attained the importance which it possesses in China and Japan. The mulberry is chiefly cultivated in Bengal, where the East India Company made special efforts to foster the production of silk as far back as 1767. Soon Bengal silk became an important article of export, and the production of silk was further stimulated by the fact that the Company itself erected silk-factories in the province. Since then the rearing of silkworms has been a stationary, if not a declining, industry in India, and the export of raw

[1] In 1894 China exported 4,344 piculs of filature silk, against 79,000 piculs of hand-reeled silk; in 1908 the export of filature silk had risen to 49,200 piculs, against 46,000 piculs of hand-reeled. (One picul = 133⅓ lbs.)

silk scarcely balances the import. In India, also, considerable quantities of silk are obtained from other moths, one or two species of which are sometimes domesticated, though for the most part they are left to themselves. These 'wild' moths are principally found in Assam, the Central Provinces, and the more sparsely peopled region in the west of Bengal. The general name of **tussur silk** is given to their produce, and most of the silk so called is distinguished by its natural fawn colour.

226. The export of silk from the Eastern Peninsula is trifling, though there, also, there must be a large local production. More important is the export of **Persia**, where the rearing of the silkworm, now principally carried on in the narrow strip between the Elburz Mountains and the Caspian, is said to have been introduced about the same time as it was into India. In an earlier period the Persian silk was widely celebrated, and was the foundation of an extensive trade with western Europe. Of other Asiatic seats of silkworm-rearing the principal are **Transcaucasia, Asia Minor,** and **Syria.**

227. Herodotus is the first European writer who is believed to have referred to silk, if, as Richthofen conjectures, the Median garments of I. 135, VI. 112, were of this material. In the early days of the Roman Empire silk had already come into use as a material for garments worn by the rich, and before the commencement of the Christian Era the raw material had been imported into Italy, where it was woven into tissues. But it was not till the sixth century A.D. that Europe was able to make a beginning with the rearing of silkworms. Justinian, who was at that time emperor of the East, and his consort, Theodora, encouraged the new branch of agriculture, of which Greece, and more particularly the Peloponnesus, became the principal seat. The peninsula just named is said to have obtained its modern name of Morea from the Greek word for a mulberry-tree. **Greece** continued to be the principal seat of silkworm-rearing in Europe down to the twelfth century; but meanwhile silkworms had also been introduced by the Arabs into **Sicily** and **Spain,** and during the Arab (Moorish) domination in southern Spain the production of silk was very extensively pursued. In all the places just mentioned the rearing of the silkworm has since sunk to a subordinate place compared with that which it has achieved in other parts of Europe. It still flourishes, indeed, in Murcia and Valencia in Spain, in various parts of Greece, and in other parts of the Balkan Peninsula; but the total estimated production of all these regions does not amount to one-tenth of that of **Italy,** which now furnishes, on an average, three-fourths of the silk produced in Europe. And now in that country the great silk-producing region is not the island into which the silkworm was first introduced, but the great plains of the North, **Lombardy, Piedmont,** and **Venetia,** in many parts of which the long rows of mulberry-trees, stripped bare of their leaves in summer,

are a speaking reminder of the nature of the industry pursued in the neighbourhood.

228. Next to the Italian production, that of **France**, chiefly carried on in the valley of the Rhone, is the largest in Europe. Between 1874 and 1885 the amount of the French production was, on an average, only about one-fourth of that of Italy, but twenty years previously to the earlier date the production of France exceeded the Italian, having been five- or six-fold its present amount. In 1856, however, the business of silkworm-rearing in France began to be adversely affected by the outbreak of a disease among the worms; and the ravages of this disease, which at a later date spread to Italy, Spain, Greece, and even the silk-countries of the Far East, were such as to bring down the silk-production in France in 1876 to less than a tenth of what it was in 1853. Since 1876, however, matters have begun to improve, chiefly in consequence of an important service rendered to the industry by science. The distinguished French chemist **Pasteur**, being appointed by the French Government to inquire into the nature and origin of this disease, discovered that by examining the moths with the aid of the microscope it was possible to distinguish those which laid healthy eggs. Since then the **microscope** has been recognised as an **indispensable instrument in the rearing of silkworms**; and while France has been able thereby to check the ravages of the disease, other countries which received it later have had the means of checking its spread before the evil attained the dimensions that it did in France.

Besides the countries already mentioned, the only European country which produces any considerable quantity of silk is **Austria-Hungary**, where the industry is chiefly pursued in the southern half of Tirol (valley of the Adige), but is rapidly extending in the Mediterranean provinces and southern Hungary.

229. In recent years the supply of raw silk in the markets of Europe and America has been yielded by different countries in the following proportions:—China, upwards of 40; Japan, about 20; Italy, rather less than 20; the Turkish Empire, about 6; France, about 8; Austria-Hungary, the Caucasus, and Persia, each less than 2 per cent.

230. SILK MANUFACTURES. The silk fibre as it is wound from the cocoon, being a continuous thread, does not require to go through the processes necessary in spinning wool, cotton, and other fibres. The making of true silk yarn is known as **throwing**, and consists merely in giving the fibre a slight twist, which enables it to combine better with other fibres. For stronger fabrics several fibres of raw silk are united, being twisted into a fine cord. The processes undergone by silk waste (221) to convert it into yarn are essentially the same as those adopted in spinning the other fibres mentioned above. The yarn so made is distinguished as spun silk from the thrown silk made by the other process.

230*a*. Of the specially named fabrics made from silk, the chief are

satins and **velvets**, the former being tissues so woven that almost the only threads appearing on the outer or 'right' side of the tissue are weft threads, which present a uniform glossy surface; the latter, tissues in which the outer surface presents to view a short soft pile, made by passing the warp threads over fine wires, which are afterwards drawn out. The loops then remaining are either left as they are, in which case the tissue is called **pile velvet**, or cut to form **cut velvet**. This fabric is now imitated in cotton and mixed tissues.

231. Though **Italy** was one of the earliest seats of the silk-manufacture in Europe, and though during the middle ages this branch of industry developed to a high pitch in Venice, Lucca, Genoa, Bologna, and other Italian towns; though, too, that country, as we have seen, stands far ahead of all others in Europe in the production of the raw material, in the manufacture of silk fabrics it ranks far behind France, and its silk is exported mostly in the form of thrown silk. The higher branches of the silk industry are now, however, growing rapidly.

232. In silk manufactures **France now surpasses all other countries in Europe** to such an extent that the value of its products is about three times that of the country which stands second, Germany. The centre of the industry in that country is Lyons, and the history of the industry in Lyons and the regions round offers some very interesting illustrations of the influence of political events, of inventions, and of fashion on the prosperity of manufactures, and the commerce depending upon manufactures. The silk industry of Lyons began to flourish after the capture of Milan by Francis I. of France in 1515, that monarch having then induced several silk artisans of Milan to settle in Lyons. Encouraged by that monarch, and at a later date by Henry IV., and favoured by the extension of silkworm-rearing in the valley to which Lyons belongs, the industry rapidly rose to a position of great importance, and the first blow inflicted upon it was due to the persecution by later French kings of the Huguenots, or French Protestants—a persecution which drove many of the French silk-workers out of France, and sowed the seeds of the industry in many other parts of Europe, even in Russia. From this blow, however, it revived, and about the beginning of the nineteenth century it received a great impetus from the invention in Lyons of the celebrated apparatus named, after its inventor, the **Jacquard loom**, for the weaving of figured patterns.

233. Originally invented for use in the making of silks, in which tasteful patterns greatly enhanced the value of tissues worn only or chiefly by the rich, this apparatus has since been applied to looms constructed for the weaving of other fabrics (linen, &c.); but its principal application is still probably in the silk industry, to the development of which, especially in France, it has greatly contributed. More recently the silk industry in that country has passed through a crisis, due in a great measure to the effect of another invention upon fashion.

Since the sewing machine has come into general use, the fashions of ladies' dresses have become more elaborate and more changeable, so that there has been much less demand for the fine and costly but lasting tissues which used to be the glory of the French looms. Silks of an inferior and less durable quality, and mixed fabrics having the appearance of silk, have been more sought after; and since the looms of Germany and Switzerland were more speedily adapted to meet the wants of this new taste, the French industry suffered greatly in the competition. Quite recently, however, the French manufacturers have begun to adapt themselves to the new requirements of the trade.

234. The **German silk industry** is carried on more or less in all the manufacturing regions of the country; but Krefeld, in the Prussian province of the Rhine, is the town which has its name most completely identified with this branch of manufacture. In **Switzerland**, Zürich and Basel are the chief seats of the manufacture, the former being most noted for its silk cloths, the latter for its ribbons. At Lyons, Krefeld, and elsewhere, there are **conditioning** houses for silk, similar to those for wool already referred to (**219**).

235. In the **United Kingdom** the silk manufacture is not nearly so highly developed as the other branches of the textile industries, and in the silk industry proper—that is, the industry in which thrown silk as distinguished from yarns spun from silk waste is employed, a great decline has taken place since the latter part of the nineteenth century. Of this decline there are several explanations. In the first place, the British Isles have not the advantage, like the chief silk-manufacturing countries of the Continent, of being able to produce any of the raw material as an article of commerce. Moreover, since the opening of the Suez Canal it has become less of a market for eastern silk. The industry has thus developed with more vigour in some of the regions in which the supplies of the raw material were more ready to hand; and when the duty on silks in this country was abolished, under the treaty with France in 1860, the British manufacturers found themselves completely beaten, even in the home market, by those of France.

The spinning of silk waste and the weaving of 'spun' or schappe silk have been growing in England, while the silk industry proper has been languishing. They are carried on chiefly in the seats of the great textile industries of the country (Yorkshire and Lancashire), not in the counties in which the original branch of the industry has long been pursued (Cheshire, North Staffordshire, and Warwickshire, besides London).

236. Under the protection of a high duty, the silk manufacture has advanced with rapid strides in the **United States**, which is now (1903) the rival of France in this industry. The chief seat of the manufacture is Paterson, in New Jersey, within fifteen miles of New York. As to artificial silks see **464*a***.

B. *Sub-tropical Products*

237. COTTON. Cotton consists of the tufts of woolly fibres which envelope the seeds of a shrubby plant. When the seed-vessel has opened, the tuft swells out to the size of an apple, and remains for a time firmly held by some of the withered parts of the plant, which partly close in upon it, but remain open enough for the cotton to be easily picked. The seeds are of about the size of small peas slightly flattened. Of all the products of a sub-tropical climate cotton is commercially the most important, and its importance dates back to the earliest times of which there is any record. **The first mention** of it is found **in Indian books** written more than eight hundred years before the Christian era. The first European writer who is known to have mentioned it is Herodotus, who wrote in the fifth century B.C., and speaks of a tree which he knew by repute as growing in India, and bearing instead of a fruit wool like that of sheep.[1]

238. The **wide diffusion** of the plant in **pre-historic times** is even more remarkable. While most of the chief cereals, along with flax and hemp, were introduced from the Old World into the New, and the New World gave to the Old maize, tobacco, and the potato, cotton was found by the earliest explorers, from Columbus to Cook, growing almost everywhere in the area in which it is now found.

239. At the present day its cultivation is almost universal in tropical and sub-tropical regions, but it is in the latter that it attains its widest extent. **The United States, India, Egypt, and Brazil are now the most important places of production** for this commodity so far as international commerce is concerned, and China is a very large producer of cotton for home consumption. In all these countries except India and Brazil, the districts where cotton is chiefly grown lie outside of the tropics, and in India, the cotton districts, though mainly tropical, are generally at least one thousand, and in some places two thousand feet or more, above sea-level.

240. The **cotton-plant** is not, however, everywhere precisely the same. The genus *Gossypium*, to which all the cotton-plants properly so called are referred by botanists, is a genus containing several species, which differ in size, in the colour of their flowers, and, what is most important from a commercial point of view, in the length, strength, and fineness of the fibres forming the tufts.

All the cultivated varieties are, however, now believed to be reducible to three species—*G. herbaceum*, Linn., and *G. arboreum*, Linn., both believed to be natives of the Old World, and *G. barbadense*, Linn., believed to be a native of the New World. The species now most widely

[1] One cotton-plant, probably *Gossypium arboreum*, was certainly known at a very remote date in Egypt. See Parlatore, *Le specie dei cotoni*, p. 16.

cultivated, both in the Old World and the New, is *G. herbaceum*, for the *G. hirsutum*, Linn., the species to which the ordinary American 'uplands' cotton used to be referred, is now regarded as a mere variety of that species. It grows to the height of about four or five feet, and produces a soft and silky wool composed of fibres of moderate length, that is, from nine-tenths of an inch to an inch and a third long. It is a native of India, Indo-China, and the Eastern Archipelago, and has been introduced into all other parts of the world with a suitable climate—into the United States some time in the latter part of the eighteenth century. There it succeeds better than in its original home, yielding on an average a fibre of about one inch in length, as against one of about nine-tenths of an inch in India, and whereas cotton grown from Indian seed improves in the United States, that grown from American seed degenerates in India. It is the product of this species, as cultivated in the United States, that is generally known in the European markets simply as American cotton. The best of all cotton, however, is that derived from *G. barbadense*, and known as **Sea Island cotton**, from the fact that in the United States it was first cultivated on the string of flat islands which line the coast of Georgia and South Carolina. It is that which produces the cotton with the finest quality of 'staple,' as it is called—in other words, that which has the longest, finest, and strongest fibres, and which in the mass has the most beautiful appearance. The length of the staple in this species may be as much as two and a half inches, though the mean length is said to be only 1·6 inches. If allowed to grow on from year to year this species of cotton may attain the height of from fifteen to twenty feet; but being, like other species of cotton, cultivated as an annual, that is, grown every year from seed, it is seldom allowed to grow to a greater height than two or three feet. The colour of its flowers is yellow. This species appears to thrive best on a slightly saline soil and where there are saline ingredients in the atmosphere, and to require a greater amount of moisture and a longer period in which to mature than the ordinary species. It is still cultivated on the islands from which it takes its name, as well as in the northern parts of Florida, and has been successfully introduced into Egypt, Tahiti, the Fiji Islands, and some maritime districts of Queensland.

241. As regards **climate**, all the species of cotton-plant require for their successful cultivation a long summer free from frost, and with a moderate but not excessive amount of moisture. The cotton-plant is generally reckoned among those which prefer a dry warm soil, but it will put up with considerable differences in soil under diverse climatic conditions. **To frost it is peculiarly sensitive**; and as it generally requires about seven months to yield a paying crop, this fact alone has a great influence on the extent of its domain. Very equable warm but not excessive temperatures, especially during the period of most vigorous growth, appear to be those most favourable to the plant, and plenty of

bright sunshine seems to be absolutely essential to the production of fibre of good quality.

242. In the **United States** the cotton-plant is for the most part confined to the south-east. At the date of the census report of 1880 there was little cotton grown to the west of 99° W., and little to the north of 37° N.[1] This region is that in which copious summer rains prevail (389 B); but the areas of greatest production are at a considerable distance from the sea-coast, the rainfall in the maritime strips being generally excessive, except for soils of the lightest character. The mean temperature during the months in which the plant is most rapidly growing and maturing its produce—June, July, and August—is remarkably uniform throughout this region, that of June varying in different parts from 76° to 81° F., July 78½° to 83° F., and August 78½° to 81½° F. Cloudless days occur during June and July in the ratio of about 1 in 4 in the more maritime and easterly parts of this region, in the ratio of 1 in 3 in the more inland and westerly, and in later months more frequently. The total area of the cotton region of the United States is estimated at upwards of 700,000 square miles, or about eight times the entire area of Great Britain[2]; but the belts of greatest relative production are the Mississippi 'bottoms,' or strips liable to occasional inundation on the left bank of the Mississippi from Memphis to Vicksburg, and the 'black belt of Alabama,' which runs from east to west across that state, somewhat to the north of its middle line. In this belt the use of manure for cotton was considered, till the latter years of the nineteenth century, quite unnecessary, and yet the yield was at least twice as great as the average of the United States generally. That average varies in different years from about 170 to 225 lbs. per acre.

243. On the uplands and the Mississippi 'bottoms,' where cotton is chiefly grown, the soil is generally rich in lime; and it is found that the extent of this branch of cultivation and the productiveness of the plant tend to increase, other things being equal, in proportion to the abundance of this constituent of the soil.

244. Throughout the United States cotton is generally planted in rows, the individual plants pretty wide apart to allow of cleaning the crop. In slave times this was done by means of the hoe, but now mule cultivators have come into universal use. In all the moister parts at least, the earth is ridged up on both sides about the roots to facilitate the escape of any excess of moisture. To a rather dry climate the cotton-plant has a certain power of adapting itself, yet an unusually dry season always involves a short crop, as an unduly wet one leads to

[1] This is still true (1902), but great changes have taken place in the distribution of cotton within this area. Before the war of 1861–65 South Carolina produced about one-half the total cotton crop of the United States, and Georgia about one-fourth. In 1880 Texas was already among the leading states, and in recent years that state has sometimes produced about one-third of the whole crop.

[2] Between 1879 and 1898 (the year of greatest acreage so far) the area actually under cotton nearly doubled, rising from less than 20,000 to 39,000 square miles.

a crop large in amount but deficient in quality. Among other things that have to be attended to in careful cotton-cultivation is, as in all other cases, the selection of the seed (139); and, second, the treatment of the plant in such a manner that the fruit, and consequently the cotton lint, is produced in greatest abundance. Hence the bush is not allowed to grow too luxuriantly, but is prevented from producing too much leafage and stalk by pruning, and where necessary by topping, that is, removing an inch or two from the end of the stem. The time of sowing in the United States is the end of March or some time in April; the time of picking in the United States, from August to the end of the year, or, in the absence of frost, even later. Picking is done by hand, and is the most expensive operation in cotton-production, but a picking machine capable of picking more than 90 per cent. of the cotton without injury to the plant is now (1902) said to have been tried with success.

245. The use of **manures** in cotton-growing in the United States began in the older cotton States, above all in Georgia and the Carolinas after the civil war of 1861–65, and has been spreading ever since, so that now (1902) the practice is getting introduced by degrees throughout the cotton area except the Mississippi bottoms and the black prairies of Texas. Investigation has shown that the plant is one of those which in ordinary circumstances reward the outlay on fertilisers most generously, and that it is chiefly ignorance and custom that prevent an even wider adoption of a more advanced system of agriculture. And in connection with this subject there is one fact of the highest importance to remember, namely, that the commodity of greatest commercial value furnished by the cotton plant is one that takes away from the soil comparatively little of its fertilising ingredients; so that if everything else were regularly returned to the soil, cotton, instead of being one of the most exhausting of crops, would be one of the least exhaustive. It is the seed that withdraws from the soil most of the important constituents, potash and phosphoric acid (56); so much so that the removal of one crop of cotton-seed impoverishes the soil to the same extent as the removal of ten crops of cotton-wool. Now it is an important fact that, though the oil derived from cotton-seed is becoming yearly an article of greater commercial value (327), the cake that remains after the expression of the oil contains most of the fertilising constituents of the seeds; and from inquiries made at the last census of the United States, it would appear that cotton-oil-cake is by far the cheapest fertiliser which could be obtained in America. The cake may be used as manure either directly or by giving it as food to animals kept in cotton-fields. Of the other manures used in the cultivation of cotton, the most important are the offal of fisheries, abattoirs, &c., and superphosphates made from the phosphates of South Carolina, Tennessee and Florida.

246. In India the mode of cultivating cotton presents some curious

and interesting contrasts to that practised in America. The period of the year during which it is grown is the same, since it is dependent on the rains of the south-west monsoon (39, 729). But in the region of India where cotton is principally grown on a large scale for export, a region lying mainly on the peninsular plateau behind the Western Ghâts, which drain the rain-clouds of most of their moisture (39), the total rainfall is often in some parts rather scanty. Beyond this region cotton is grown, in extra-tropical India, chiefly in the North-West Provinces and the Punjab, where the rainfall is even scantier, but where there are extensive areas under irrigation. As regards temperature, the chief cotton-growing region of India differs from that of the United States in having the higher temperatures in early summer and apparently in having a smaller proportion of bright weather. In furnishing the following data for comparison, Akola may be taken as typical of Berar and Belgaum of southern Bombay:—

		May	June	July	August
Akola, 930 ft.	Mean temp. F.	93°	86°	80°	79°
	Percentage of cloud	19	62	85	80
Belgaum, 2,550 ft.	Mean temp. F.	80°	74°	71°	70°
	Percentage of cloud	34	77	88	85

247. On the table-land of India the scantiness of the rainfall is made up for by the peculiar character of the soil, which, from its colour and from its being so admirably adapted for the growth of native cotton, is generally known as the **black cotton-soil**. It is derived from the decomposition of the basaltic rocks which cover so large a portion of the peninsular area of India. It is of great fertility, and is said to have borne crops for thousands of years without manure. In one important point this soil agrees with the best soils of the cotton region in the Mississippi valley, namely, in the presence of lime. Soft nodules of *kunkur*, containing carbonate of lime in the proportion of from 50 to 80 per cent., are scattered through it. But the characteristic which renders it of such peculiar value in a region with so dry a climate is its **remarkable tenacity of moisture**. Instead of allowing the rain to sink away like the best cotton-soils of America, it becomes during the rains a tenacious mud. In dry weather the whole surface of the ground where this soil occurs becomes seamed with inter-ramifying cracks, between which the soil forms hard lumps, which still, however, retain water imprisoned in their spongy cells. Hence, dry as the climate is, and notwithstanding the rapidity with which evaporation takes place on the surface, wherever this soil prevails irrigation is not required for cotton-culture. On the other hand, there is no necessity, as in America, for growing the cotton in ridges. For the most part the seed is sown broadcast, and often mixed with the seeds of other crops. The crowding of the plants is thought to be even an advantage, as tending to retard evaporation from the soil.

248. The yield per acre of cotton in India is everywhere much

less than in the United States, being hardly anywhere as much as 100 lbs. per acre. This difference is, no doubt, largely due to the inferior cultivation of the latter country generally, but is probably chiefly to be explained by the fact, that whereas in India manure is even less used than in the United States, the former country has not, like the latter, vast areas of new land to turn to when the old is more or less exhausted. Of late years the quality of Indian cotton has been greatly improved, more care being bestowed than formerly on its picking, and keeping it free from dirt after being picked.[1]

249. In Egypt, the cultivation is necessarily confined to the delta and the part of Middle Egypt where the system of irrigation allows of moisture being supplied at intervals to the plant through the eight months required for its growth; and it is hence of modern introduction (**799**). In this country, the plant for which in the United States an excess of moisture is so much dreaded may be seen flooded from time to time without injury, the remarkable dryness of the atmosphere promoting rapid transpiration, and thus preventing excess of moisture in the tissues of the plant. The rich soil gives a higher average return than even the United States, the **yield amounting to about 500 lbs. per acre.** For the most part the crop is unmanured, but it has been shown that about 200 lbs. can be added even to this large yield by the use of manure, and the practice of top-dressing is spreading. The high quality of Egyptian cotton indicated in the note below is no doubt to be ascribed partly to the fertility of the soil, and partly to climatic conditions. The skies are mostly bright, and the temperature rises and falls during the period of growth with remarkable regularity, as is shown by the following figures showing the mean temperature at Cairo from March to October:—

	March	April	May	June	July	Aug.	Sept.	Oct.
Temp. F. .	62°	71°	79°	84°	85°	84°	79°	74°

The combination of conditions met with in the Egyptian delta seems not to be found elsewhere. Egyptian cotton has been tried in Sind, where the climate is sufficiently bright and dry, but has failed probably in consequence of the high temperatures of the earlier part of the season. The excessive heat of Upper Egypt has been found to be prejudicial to the strength of the fibre grown there. Egyptian cotton has also been tried in Texas, but though the temperature curves of some parts of Texas (as at San Antonio) are wonderfully close to that of Cairo, in those parts the climate is not equally bright and dry. Success in the cultivation of Egyptian cotton has, indeed, again and again been

[1] The average price of cotton imported into the United Kingdom from the United States, Brazil, and Peru in 1901 was about 2·5*l.* per cwt.; that of Indian cotton, 2·01*l.* per cwt.; and that of Egyptian cotton, about 3·3*l.* per cwt.; but in the case of India the figures do not fairly represent the relative value of Indian cotton, as only a trifling proportion of that cotton comes to this country, and that of inferior quality. The better Indian cotton goes mainly to Japan.

announced, but has never yet been established by experience. The area under this crop in Egypt amounted in 1884–85 to about 1,350 square miles,[1] or about one-seventh part of the entire cultivable extent.

250. At the present day these three countries, the United States, India, and Egypt, furnish to the United Kingdom considerably more than nine-tenths of its total supply of raw cotton, although about a century ago the supply from each of these sources was either nothing at all or relatively insignificant. During the period 1786–90 the British West Indies furnished more than 70 per cent., the Mediterranean countries 20 per cent., Brazil about 8 per cent. of the total British supply; while the share of the United States and India together was under 1 per cent., and Egypt contributed nothing at all to the import from the Mediterranean. In the period 1886–88, on the other hand, when the total import had swollen from about 25,000,000[2] lbs. to about 1,750,000,000 lbs., the share of the United States had risen to 75 per cent., that of the East Indies to 12 per cent., and that of Egypt to 9½ per cent., while the share of Brazil had sunk to 2¾ per cent., and that of the British West Indies to insignificance.[3] Brazil is thus the only country which still retains any great importance as a cotton-producer among those which had most importance a hundred years ago. Of the other countries from which Great Britain derives supplies of cotton the only ones that need be mentioned are Turkey (chiefly Asia Minor), Venezuela, Colombia, and Chile. At the present time (1910) special efforts are being made to encourage cotton cultivation in various parts of the British Empire, more particularly in West Africa, the British West Indies, and the Egyptian Sudan. Large quantities of raw cotton are grown in Russian Central Asia (708), but this is solely for Russian consumption.[4]

251. Now it is to be noted that it is to commerce alone that we owe the extraordinary development of the cotton-production in the United States and Egypt, and the great extension of this branch of cultivation in India. Of the cotton grown in Egypt almost the whole is exported to Europe. Indian cotton is also largely exported, and even yet (1910) Georgia and N. and S. Carolina are the only states of the Union which consume a large proportion of the cotton they grow.

[1] In 1898–99, 1,416 square miles.

[2] Not 250,000, as was stated by an oversight in the earlier editions.

[3] In 1900, 78 per cent. from the United States, 18 per cent. from Egypt, only 2 per cent. from India.

[4] The total consumption of raw cotton in the world (presumably in countries using modern machinery, the domestic consumption of China being left out of account) was estimated in 1890 at 5,228, in 1900 at 6,802 million lbs., about 85 per cent. of which was supplied by the United States. In 1902 the total amount of raw cotton imported from British tropical possessions outside of India was under 430,000 lbs., and nearly all that came from the West Indies. In 1906 the amount of raw cotton consigned to the United Kingdom from British West Africa (chiefly Lagos and Nigeria) was 2·87, that from the West Indies 1·8 million lbs. Another million lbs. came from British Central and British East Africa.

252. The form in which the cotton is exported is that of bales, or large bundles of **cleaned cotton**, that is, cotton-wool freed from its seed by a process called **ginning**; and it is an interesting fact, illustrative of the variety of circumstances that affect the development of commerce, that the early extension of cotton-production in the United States was due to the invention of an improved process for effecting this purpose. Previously the process of getting rid of the seed was a laborious one, and hence one that demanded on economical grounds the cheapest available labour; and in 1792 so little was it thought probable that the United States would ever grow any considerable quantity of cotton, that, in a treaty concluded with Great Britain in that year, the United States Government agreed to a provision which forbade the export of cotton from the United States to this country. In 1793 the invention of the saw-gin by Eli Whitney (an invention since then greatly improved upon) imparted such a stimulus to the cultivation of cotton in the United States, that that country rapidly became the chief source of supply of raw cotton in the world. The growth of cotton in India and Egypt received a great impetus from the scarcity of the raw material due to the civil war in America in 1861–65, and the effects of that impetus are still felt in both countries.

Inventions by which the processes of manufacturing cotton were cheapened have likewise been, as is well known, among the chief causes that contributed to the vast development of the commerce in this commodity in various forms; and it is a fact of great consequence in the history of British commerce that all the more important of these inventions originated in England.

253. COTTON MANUFACTURES. The early history of the cotton manufacture in Europe is far from being fully known. The **Arabs** are said to have introduced the cultivation of the plant into Spain in the eighth century. It is an ascertained fact that in the middle of the following century cotton manufactures on a pretty extensive scale were carried on in the Moorish towns of **Cordova**, **Granada**, and **Seville**.[1] **Augsburg** is known to have exported cotton fabrics of its own manufacture in the fourteenth century. The first recorded importation of cotton into England was in 1298, for the making of candle-wicks (a manufacture, it must be remembered, of much greater relative importance in days when candles were the chief means of artificial lighting than now). In 1352 we find the first mention of Manchester cottons, but the fabrics so called were not what we know as cottons. Even as late as the seventeenth century a coarse kind of woollen cloth, a web of frieze, was known as cotton (Manchester, Kendal, and Welsh cottons of this kind are all mentioned), and the 'New English Dictionary' expresses a doubt as to whether the term in this sense is of the same origin as the word in its present meaning. Later the term appears to

[1] It is no doubt to this fact that cotton owes its name, which is of Arabic origin.

have been applied to mixtures of wool and cotton or linen and cotton. That true cotton was used in Lancashire about 1640 appears from the fact that about that date there is mention of Manchester cotton buyers in the Levant. Pure cottons the English weavers were unable to make till long after. The use of cotton in manufactures extended very slowly. Between 1697 and 1749 the import of the raw material into England remained almost stationary, and there can be no doubt that about the latter date, and for some years after, the manufacture of cotton goods on the continent was greater than in England. A change in this respect was brought about by the inventions that took place in England towards the end of the eighteenth century, and revolutionised first the cotton industry, and ultimately textile industries of all kinds.

254. Without entering into details, for which we have no space, it is impossible to give an idea of the nature of these inventions, but a few dates are worth noting. In the first place, it may be mentioned that the most ancient method of spinning was by means of a distaff and spindle, the former an implement for holding the fibre to be spun, the latter for receiving the spun, that is, the more or less twisted fibre that forms the yarn. This arrangement was superseded by the spinning-wheel, the origin of which is uncertain. Not improbably it was used in the East long before it was known in Europe, but several forms of it appear to have been invented on the European mainland in the sixteenth century. Before the great era of inventions this machine had become common to the whole continent. The spinning-jenny of Hargreaves, invented in 1764, patented in 1770, was the first machine by which more than two yarns could be spun at once. The water-frame of Arkwright (so called because soon after its invention water was used as a motive power in driving it) was an improved device for the same purpose, patented in 1769. In its improved form it is known as the throstle. The mule of Crompton, a sort of cross between the jenny and the throstle, patented in 1779, was a much better contrivance than either, and is the machine still most used for the spinning of weft yarns. These three machines changed in a great measure the condition of the cotton industry in Great Britain. The spinning-jenny was, indeed, an instrument that could be used in domestic spinning, and the chief effect of its invention was that the old spinning-wheel was thrown away into lumber-rooms, and the jenny adopted in its place, with the result of greatly increasing the output of yarn in each family. Arkwright's machine, however, was one more suitable for working in large factories; and factories began to multiply when, in 1785, it was declared that Arkwright had no claim to the patents which he had obtained, so that any one might adopt the inventions that had been patented in his name. The result was, that whereas in the old days of the spinning-wheel the weaver might have to spend the morning going about to half a dozen

cottages to obtain yarn enough to employ him for the rest of the day, there was now so much yarn produced that the supply greatly exceeded the demand. The hand-loom weavers were unable to use up the yarn that was produced.

255. The next step was the invention of the first power-loom by Mr. Cartwright, a clergyman having little knowledge of mechanics, and none of weaving. His first machine was patented in 1785, and an improved form in 1787; but even this second form had to be improved upon by further inventions before it could be made practically useful, that is capable of weaving cloth as rapidly and cheaply as a hand-loom.

256. Since that date a new spinning-machine known as the **ring-spinning-frame** has been invented. It was first put in operation in the United States about 1832, but has only of late years been applied with success in the United Kingdom, where, however, it is rapidly growing in favour for the production of warp. In all machines, improvements in detail are almost uninterrupted, and all processes conducted by machinery have been greatly accelerated by the introduction of steam-power to drive the machines. This was first applied in the cotton-industry at Papplewick in 1785. In the case of spinning, the result of the change since the time of the early inventions is illustrated by the following facts. When the hand-wheel was still in use it required six or eight spinners to keep a weaver employed, and the earnings of a family amounted to only a few shillings per week. Even the mule was first employed as a domestic machine, and the earnings of a farmer in spinning were raised in some cases to as much as 6*l.* per week. The steam-driven mules of the present day contain about 1,100 spindles or more. They are erected in pairs, and each pair is managed by a man, a youth, and a boy; and the outturn of the two machines per week of 55½ hours amounts to about 1,700 lbs. of a yarn of medium fineness, at a cost of about $\frac{7}{18}$*d.* per lb. in wages.

So rapid in their working are the looms now constructed that the best machines are capable of throwing the shuttle across the web more than 200 times a minute, and at an exhibition at Oldham in 1884 one was shown which was capable of doing so 400 times a minute, or nearly seven times a second.

257. All these inventions were extensively applied in England a considerable time before they were introduced on the continent of Europe. In applying them England was peculiarly favoured by its abundance of coal and iron, and its admirable situation for commerce (**494**). Moreover the wars which raged on the continent of Europe from about the time when these inventions began to take effect down to 1815 interfered with the development of industry on the continent much more than in Great Britain. The consequence was, that England became pre-eminently the seat of the cotton industry, and even in 1801 manufactured more cotton than the entire continent of Europe

The value of cotton goods exported from Great Britain was officially estimated in 1785 at less than a million sterling; in 1815 it was estimated at upwards of twenty-two millions. To show the effect which the development of this single industry had upon the growth of British commerce, it may be mentioned that in the former year the value of the cotton export was a little more than 5 per cent. of the whole value of the exports; in the latter year, about 38 per cent. (comp. 218).

258. Since then the volume of the British cotton industry has gone on increasing with but slight fluctuations. The rate of that increase since 1848 is indicated by the quinquennial averages of imports of raw cotton and exports of cotton goods given in the appendix.[1] But though these figures show a general increase in volume, an important change has been going on in the destination of the manufactured goods, owing, on the one hand, to the rapid introduction of spinning and weaving factories into the European continent and the United States, and, on the other hand, to the gradual cheapening of the machine-manufactured cotton by improvements in machinery and the increase in the facilities for communication with the Far East. The first of these circumstances is steadily lowering the proportion of woven goods and yarn taken from us by the continent and the United States; the latter, by enabling the goods of England to compete even with the cheap hand-labour of India and the East, has led to a great increase in the proportion of manufactured cotton goods that are supplied to these markets. In 1820 the continent of Europe received more than the half of the total quantity of cotton fabrics exported from Great Britain, the United States (which then had less than one-fifth of the population contained by them in 1880) received nearly one-tenth, and Eastern Asia little more than one-twentieth; in 1880 the continent of Europe received scarcely one-twelfth, the United States less than one-fiftieth, and Eastern Asia (chiefly British India) more than one half of the whole. Of yarn Great Britain still supplies large quantities to the continent of Europe, but the proportion of the whole amount exported declined from above 95 per cent. in 1820 to 48 per cent. in 1891[2]; while eastern Asia, which in 1820 received no appreciable quantity of British yarn, received in 1891 33 per cent. of the amount exported.[3] (See, however, **259***a*.)

259. Such facts point to a more rapid growth of the industry on the mainland of Europe and in the United States than in our own country, and the significance of this fact is discussed in the introduction (pars. 15–18). So far, the development of the cotton industry on the continent of Europe and in the United States has deprived the United Kingdom chiefly of the market which these countries themselves afforded. In some cases, however, British cotton tissues have not held

[1] See Introduction to the Fourth Edition, par. 17.
[2] In 1901, 52 per cent.
[3] In 1901, 25 per cent.

their own, even in neutral markets, and that, it is alleged, on account of their bad reputation, deserved or undeserved. This reputation is due to the employment of an excessive amount of size in their manufacture. Size is a mixture containing starchy and fatty matters and other ingredients, necessary to facilitate the working of the yarns in weaving. In the dear years for cotton goods during and just after the American Civil War (1861–65) cottons containing an excessive amount of size mixed with china clay were largely manufactured, but since cotton and cotton manufactures have fallen in price such goods have been driven out of the market. One serious objection to the production of such fabrics is that when china clay is used in excess it is necessary, in order that the yarns may retain the clay, that the weaving-sheds should be steamed to such an extent as to injure the health of the workpeople.[1]

259a. A formidable rival in cotton-spinning by machinery has sprung up in India since about 1876. The cheapness of labour there is a complete set-off to its inferior efficiency; and notwithstanding the greater cost of machinery, coal, and other elements of production, the advantage of having the raw material at hand enables Indian cotton-mills not only to command the home market for certain yarns, but also to export these yarns in rapidly increasing amount to China and some other Eastern markets. The yarns made in Indian mills are the coarser kinds, for which alone the native cotton is suited. But it is these yarns for which the East affords the chief market. Between 1876–77 and 1890–91 the cotton yarn exported from India to China (including Hongkong) and Japan increased year by year from 7·9 to 161·2 millions of lbs., whereas that from the United Kingdom to these parts fluctuated greatly, and never reached 48 million lbs. From the beginning of the last decade down to 1891 inclusive the total British export of cotton yarn has been stationary in amount. In the southern States of the American Union a development of cotton-spinning under similar conditions to those which hold in India has taken place in recent years. The number of spindles there employed in cotton spinning rose from 559,320 in 1879–80 to 1,218,346 in 1886–87,[2] and this has checked the growth of cotton-spinning in the north-eastern States of the Union in the same way as the rise of the industry in India has checked the development in England.

260. TOBACCO. The tobacco of commerce consists of or is obtained from the dried and otherwise prepared or 'cured' leaves of several species of a genus of plants known to botanists as Nicotiana, and now cultivated more or less in almost all parts of the world that have a warm enough summer. The use of tobacco in smoking and other ways is due to the presence in the leaf of a principle known as

[1] In 1889 an Act was passed to prohibit excessive steaming.

[2] In India the number of cotton spindles increased from 1,461,590 in 1879–80 to 5,546,300 in March 1907. See also Introduction to the Fourth Edition, par. 18.

nicotine, which enables it to act as a stimulant and narcotic, but which, being an active poison, is capable of exercising most injurious effects if swallowed. The species of tobacco most usually cultivated is the *N. tabacum*, Linn., which grows to the height of from four to six feet, and produces several clusters of beautiful pink flowers.

261. The tobacco-plants are all natives of America, and the use of the leaf in smoking was widespread in that continent at the time of its discovery, in 1492. The practice was quickly adopted by the European discoverers, and by them was introduced into Europe, where, notwithstanding the prohibitions and denunciations of popes and crowned heads, it spread, at first slowly, afterwards more rapidly. In Europe the plant is said to have been first **cultivated** for its ordinary uses **in Holland in 1615**, but it soon extended to other countries. The increasing fondness of the people for the enjoyment of this luxury induced governments to encourage the cultivation for the sake of raising a revenue out of it. In Great Britain the cultivation of tobacco was forbidden at an early date for the sake of encouraging it in Virginia, where it became an important object of agriculture and article of commerce almost immediately after the foundation of the colony. In Ireland, the cultivation of the plant was allowed till the reign of William IV., when an Act was passed prohibiting it there also, for the sake of the convenience of raising the revenue; and both in England and Ireland the prohibition was continued till 1886, when the cultivation of the plant was again allowed under certain conditions.

262. Like maize, barley, and potatoes, tobacco is **adapted to very diverse conditions.** It can be grown anywhere in the tropics, and has been cultivated with success even in some of the counties of Scotland. The period within which it comes to maturity varies according to circumstances, and the limitation of its range arises principally from the **necessity of protecting** it during growth **against frost.** This is particularly necessary in the early stages, when a single white frost is enough to spoil the whole crop; and this is one reason that recommends the usual practice of sowing the seed in small beds, from which the tobacco is afterwards planted out in the fields, for in these seed-beds the seedlings can be sheltered from frost by being covered with dried leaves or some other light material. Stagnant water about the roots is also quickly destructive to the plants.

263. Adaptable as tobacco is to a great variety of conditions, it exhibits in a peculiar degree the effect of this diversity in the differences of the characteristic qualities of the product. The tobacco obtained from a variety of the plant adapted to one soil and climate is widely different from that which is obtained from a variety adapted to a different soil and climate. These diversities are well illustrated within the wide area of the United States, in which Wyoming was the only region that had no tobacco cultivation down to the date of the census returns of 1880. The chief tobacco states of the

Union are, however, Virginia and Kentucky, between about 36° and 38° N.

264. At the present day the total tobacco-production of the **United States** is by far **the largest in the world**, and that country furnishes nearly 80 per cent. of the tobacco imported into the United Kingdom. Next in quantity of production ranks **British India**; but the quality of native-cured Indian tobacco is generally inferior. **Cuba, Brazil**, the **Philippine Islands**, and **Asiatic Turkey** are the other non-European countries of most importance for the quantity or quality of the tobacco which they produce. **Cuba** is, above all, noted for the quality of its cigars, which take the name of **Havanas**, from the place of export. The high reputation of the cigars bearing this name was originally due to the aromatic quality of the tobacco grown in the district known as the Vuelta Abajo (to the west of Havana); but now, it is said, not one-half of the so-called Havanas of commerce are made even from Cuban tobacco, large quantities of tobacco grown elsewhere being imported into Cuba to be manufactured into cigars and then re-exported as genuine Havanas. In particular, Cuba receives large supplies from the **Philippine Islands**, the tobacco of which ('Manilla') is likewise remarkable for its aromatic flavour.

265. In Europe, the chief tobacco-growing countries in the order of the quantity produced are **Austria-Hungary, Germany, Russia**, the **Balkan Peninsula**, and **France**; and Hungary enjoys the reputation of producing that of the best quality. All these countries supply more or less of the British demand for this commodity. Under the new regulations permitting the cultivation of tobacco at home, several crops were grown in 1886 in Kent and other English counties, and the experiment is said to have been a success so far as the quality of the tobacco is concerned; but commercially the attempt to revive the cultivation of tobacco in England proved a failure. All but a small percentage of the tobacco imported into the British Isles is unmanufactured, the duty on manufactured tobacco (including snuff) being considerably in excess of that on the unmanufactured article.

266. Relatively to population, the highest consumption of tobacco is in the Netherlands and Switzerland, in both of which countries it is upwards of 6 lbs. per head per annum. Next come Belgium, the United States, Austria-Hungary, Germany and Denmark. The average consumption in the United Kingdom is not a fourth of that in the Netherlands, and little more than a third of that in Germany.

Besides being used as a luxury, tobacco is used to a small extent in medicine, and more largely as a **sheep-wash** for the destruction of insects which infest the fleece.

267. OPIUM. Opium is the **hardened juice of a cultivated species of poppy** called *Papaver somniferum*, Linn., which is believed by some to be only a variety of the wild species *P. setigerum*, DC., a native of the shores of the Mediterranean. Whether this be so or not, there is

reason to believe that the cultivated form has existed in India for a period not far short of three thousand years. The juice is contained in the seed-vessel, the wall of which is scratched so as to allow it to exude. It then hardens, and is picked off. Opium is chiefly used as a stimulant or narcotic, and is either swallowed in small quantities or smoked (by itself or in prepared mixtures), or taken in the form of certain preparations made from it. Of these the most important are **laudanum**, which is made by soaking opium in spirits of wine, and solutions of **morphia**, which is the narcotic principle of opium.

268. It is **in India** that opium is chiefly grown as an article of foreign commerce, and in British India its cultivation is **a monopoly of the government**, which derives from this article in one way or another an annual revenue of about ten millions sterling. The two districts in which it is **grown** are, the valley of the Ganges, **round Patna and Benares**, and a fertile table-land further west, corresponding to the old **kingdom of Malwa**, still chiefly under native chiefs, both lying between about 24° and 26° N. The former district is under British rule, and there the government makes annual contracts with those who are willing to cultivate it, these contracts always obliging the growers to sell the whole crop to the government at a fixed rate, according to quality. Opium grown in the native states pays a large duty on crossing the British frontier. The principal part of the opium revenue is derived from the opium exported chiefly to China, but a considerable revenue (about one-tenth or one-eleventh of the whole) is derived from the opium consumed in India itself, which is known as excise opium. Opium is most largely used as a stimulant in China, and that country consequently **receives the largest import of this drug.**[1]

269. Outside of China and India, opium is chiefly consumed in Mohammedan countries, where it has come into pretty general use as a substitute for wine and spirituous liquors (**261**). **Persia** and **Asia Minor** are hence the principal countries of western Asia in which this drug is cultivated, and in both it forms an article of export. The export of Asia Minor is next in quantity to that of India, and in quality the product of this region surpasses that of any other part of the world. In the countries of western Europe opium is chiefly used in medicine, and the English supply is mainly derived from Asia Minor (Smyrna). In the United States many of the people of European origin are said to have learned from the Chinese immigrants the practice of using opium as a stimulant, and the practice is believed to be rapidly spreading.

270. TEA is the name given to the dried leaves of one or more shrubs or trees allied to the camelia. The agreeable stimulant to

[1] Towards the end of 1906 edicts were issued by the Government of China having for their object the suppression of the use and cultivation of opium in that country within ten years, and in 1908 the Government of India agreed to limit the export of Indian opium to China to 61,900 chests in 1908, 56,800 in 1909, and 51,700 in 1910. Further reduction is to depend on the proved efficacy of the edict in China.

which tea owes its value in commerce is, chemically, almost identical with that found in the two commodities next considered, coffee and cocoa. These three commodities likewise agree in requiring for their cultivation at least warm summers with frequent rains, although they differ greatly in the degree of cold they will stand. They also agree in requiring more or less cheap labour to prepare them for the market, and this necessity in many cases excludes them from regions where the climate is quite suitable. Lastly, they agree in being derived from trees which take a certain number of years to come into profitable bearing, and this circumstance would appear to have some effect on the fluctuations of prices of these commodities, and hence indirectly on their geographical distribution. The fluctuations in price are very striking in the case of coffee. In 1854, the first year for which we have records of average import prices for the United Kingdom, the average import price of coffee was 2*l.* 6*s.* 5*d.* per cwt. The price gradually rose with minor fluctuations to 3*l.* 9*s.* 7*d.* in 1863, then similarly fell to 3*l.* 0*s.* 8*d.* in 1870, rose again to 5*l.* 0*s.* 8*d.* in 1874, fell to 3*l.* 19*s.* in 1885, and then rose to another maximum of 4*l.* 9*s.* 9*d.* in 1896. No doubt several causes have contributed to these fluctuations, but it may be suspected that one cause is to be found in the long period of waiting for returns. High prices are likely to stimulate the laying out of coffee plantations in all parts of the world that meet the requirements of climate and labour. When these plantations come into bearing there is likely to be an over-supply, leading to a fall of prices that tends to throw out of cultivation the plantations in those parts of the world that are least favourably situated. Somewhat similar fluctuations are observable in the case of cacao prices. They are not so, however, in the case of tea, the price of which has fallen almost uninterruptedly since 1865. But here we have to note another geographical effect. During this period of falling prices the area under tea has been steadily expanding in India, and latterly also in Ceylon, but the increasing production of these two parts of the world has evidently told severely on China, which has not adopted modern methods of transport, and only quite recently and to a very limited extent has introduced modern machinery for preparing the leaf. The Chinese export of tea both by sea and land amounted in 1881 to about 300 million lbs. Before the end of the nineteenth century it had sunk to less than 215 million lbs.[1]

[1] Considering the extensive consumption of all these products one may well be struck at the comparatively small total quantities of them entering into the commerce of the world, and still more at the comparatively small areas required for their production. The bulkiest and that requiring the greatest extent of ground is coffee, the total amount of which annually produced is believed to be a good deal under 1,000,000 tons, which may be compared with the 4½ to 5 million tons of wheat and flour annually imported into the United Kingdom. Probably an area of 25,000 square miles, or about half that of England without Wales, would suffice for the production of that amount of coffee. The 67,000 tons of cacao estimated as produced about the beginning of the twentieth century might be grown on an area of about 600 square miles, or less than that of the county of Hertford.

271. The tea-plant comes into full bearing in the fifth year. It generally grows to the height of from three to eight feet, but sometimes much higher. One variety, which grows wild in Assam, and is by some regarded as the stock from which all other tea-plants are derived, attains the dimensions of a large tree. The name of the plant and its product is Chinese, which is due to the fact that it was in China that the plant was first cultivated, and that Europeans first became acquainted with it. Even in China the plant is said to have been unknown till the middle of the fourth century of the Christian era, and it did not come into general use in that country till four or five centuries later. The first European who is known to have mentioned it is the traveller Pinto, who visited Canton in 1544. As late as 1664, the English East India Company, when it wished to make a present of some tea to the King of England, had to buy a small quantity for the purpose from the Dutch, and when it was first imported into England, in the year following (1665), it was sold at the rate of 3*l.* per lb.

271*a*. Tea is one of the hardiest of all subtropical plants. Severe frosts, such as it is exposed to in northern China (36*a*), check its growth and diminish its yield, but do not kill it. The plant is hence suited for a wide range of climate, but the climate best adapted for it is that which is warm, moist and equable throughout the year. Like the cotton-plant the tea-shrub requires regular supplies of moisture during the summer months, but is easily injured by an excess of moisture settling about its roots; so that the ground on which it is grown ought to have good drainage. All these conditions are best obtained on the slopes of mountains within the tropics or in sub-tropical regions, and it is in such situations that tea is chiefly grown up to an elevation which varies with the latitude.

272. The soil best suited to the tea-plant is said to be virgin forest soil, a light, rich, friable loam containing a good supply of vegetable mould or humus, or of organic matter in some other form; and such soils are also most readily obtained in the situation just described. The presence of **iron** either in the soil or subsoil is believed to be always desirable, and hence reddish soils are preferred to others which are equally suitable in other respects. It is noteworthy that, unlike cotton (243, 247), tea is chiefly grown, in the principal countries of its production, on soils that are remarkably poor in lime.

273. But the successful cultivation of the tea-plant depends not merely upon soil and climate. In its preparation for the market tea demands a good deal of hand-treatment, so that it can be profitably grown as a marketable commodity only in those parts of the world which, besides having the other conditions suitable, have a plentiful supply of cheap labour. It is for this reason that China, India, Ceylon, and Japan are still the principal countries of its production. Down to 1885 China supplied about five-sevenths of the total tea-exports of

the world. The change that has since taken place in the regions of production of tea for the world market has already been referred to (270). In 1888 the aggregate import of tea into the United Kingdom from India and Ceylon first exceeded in amount that of Chinese origin.

273a. In China the first crop of leaves is gathered from it at the end of the third year, but care is taken not to exhaust the plant by stripping it too closely. Thrice in the year the leaves are picked—in the third, fifth, and eighth month. The best leaves are the young ones, and as the youngest are first picked, the earliest gathering is the best. Women and children are mainly employed in this work. Having been first dried in the sun, the leaves are then trodden out by naked-footed labourers, in order to break the fibres and extract the moisture. This done, they are heaped up and allowed to heat for some hours, until they have become a reddish-brown colour. They are next rolled up by the hand, and are afterwards again exposed to the sun should the weather be propitious; but if not, they are slowly baked over charcoal fires. The object of the rolling is to mass the leaf in a state conducive to rapid fermentation, which is brought about by exposure of the leaf to a temperature of 104° F. for about an hour, and has the effect of reducing the proportion of tannin in the leaf from ten or twelve to about five per cent. The fermentation is finally stopt by drying in the sun or by the baking over charcoal fires. With this process the preparation of the leaves in the form in which 'black tea' is mostly sent to the market is complete, 'and they pass from the hands of the growers to those of the native merchants. By these purchasers they are carefully sifted, the leaves of different sizes and ages are separated, and the stems and damaged leaves are removed.' In the preparation of 'green tea,' there is no fermenting process, but the leaves are merely roasted in an iron pan while being stirred with a stick, and then rolled a little, these operations being repeated several times in succession and the tea finally dried off. Rolling machinery is very little used in China, but the severe competition brought about by the development of tea cultivation in India and Ceylon has at last (since about 1898) led to its introduction.

Tea is also prepared in China in the form of bricks and tablets for convenience of land transport by porters or pack-animals. The ordinary brick-tea is made only of the refuse of the tea prepared by ordinary methods—inferior tea-leaves, stalks, and tea-dust. But of late years the finest tea-dust has been compressed by steam machinery into tablets of tea of excellent quality, which are exported to Russia. A kind of tea known as 'flat tea' is prepared in Japan from unrolled leaves picked from bushes that have been partly blanched by being grown in the dark for two or three weeks before picking.

274. The introduction of tea-cultivation into **India** was due to government incentive. Experimental plantations were started by the Indian government on the hills of **Assam**, and at different points on

the southern slopes of the **Himalayas**, between 1834 and 1849, and a grant of land was made by the government to the first private tea-company formed in India, in 1839. It is only since 1851, however, that tea-planting in India has been a marked success.

274*a*. The single province of **Assam** contains more than half the total area of Indian tea-plantations, but tea is also extensively grown at various points on the **Himalayan slopes**, in Bengal, the North-West Provinces, and even in the Punjab, and also on the **Nīlgiri Hills** in southern India, and to a very small extent in Lower Burma. In northern India the limit in height of profitable cultivation is mostly about 3,500 feet above sea-level, but on the Nīlgiris the best elevation is from 4,800 to about 5,600 feet.

275. There are three main varieties cultivated in India—the Chinese plant, which yields a comparatively weak tea, and furnishes a small yield; the native tea of Assam; and a cross between the two, which last is most in demand among the planters. The method of cultivating and preparing tea in India is much the same as in China, except that the bushes while bearing (that is, during the southern monsoon, March to November—729) are picked about once every ten days, and that the rolling is performed by machinery. The average yield of an acre under tea in India varies in different localities from about 100 to above 400 lbs. per acre, and statistical returns on this head would seem to betoken an improvement in the methods of cultivation. In 1882 the average for the whole of India was under 300 lbs. per acre, but in 1900 it was above 370 lbs. These figures, however, are for the whole area under tea, inclusive of immature plants. In the principal tea-growing province, Assam, the average yield of the gardens containing mature plants was nearly 470 lbs. per acre.

276. About 1880 the cultivation of tea in **Ceylon** began to extend with extraordinary rapidity in consequence of the failure of the coffee-plantations (287). The soil and climate have been found to be admirably suited to the shrub, which has yielded in some localities as much as 1,000 lbs. an acre; and the cheap coolie labour, no longer required on abandoned coffee-plantations, affords the means of preparing the product for the market at the smallest possible cost. Leaf-rolling machinery here, also, is in general use. The rapid growth of tea-production in Ceylon is shown by the fact that the export increased uninterruptedly from 1·67 to 148·6 millions of lbs. in the last eighteen years of the nineteenth century.[1] The year 1888 was the first in which the export exceeded one million lbs.

277. Into **Japan** and **Corea** the cultivation of the tea-plant is said to have been introduced early in the ninth century A.D., and the former

[1] The first year in which there was a diminution of the Ceylon export of tea was 1901. The industry was then somewhat depressed even in India and Ceylon, but the condition of the industry has since improved, partly in consequence of the increasing use of tea on the mainland of Europe. The consumption in India, so far as it has been estimated, was calculated in 1906 at only ·033 lb. per head.

country has now an export trade in this article which ranks next in quantity and value after that of India and Ceylon. Japan tea is mostly prepared as green tea (the leaf being simply steamed, rolled and fire-dried). Almost the whole of this export is taken by the United States.

278. The cultivation of tea has likewise been tried with more or less success in Java, the United States, Brazil, Trans-Caucasia, Jamaica, Natal, and Madagascar. The first plantation on **Java** was formed in 1827, and after that date the area under cultivation extended considerably, but of late years it has shown a tendency to decline. The high price of labour in the United States generally makes tea unfit for cultivation as a marketable commodity, though it is grown for home use on a small scale on many of the farms in the southern States, and in California. Promising experiments on a commercial basis but on a small scale have been made at Summerville, near Charleston, South Carolina. Tea of excellent quality has been grown among the German colonies of southern **Brazil**, but, so far, this is little more than an experiment. The experiments that have been made in tea-cultivation on the western seaboard of Trans-Caucasia have been quite satisfactory as regards the suitability of the climate. The shrubs grown there have attained normal dimensions, arrived at full maturity, and produced excellent seeds; and a beginning was made about 1890 with the laying-out of tea-plantations for commercial purposes.[1]

279. Outside of Asia, people of English and Russian race are by far the greatest consumers of tea. Of the total amount exported from all countries in one year, the **United Kingdom** takes not far from one half, **Russia** less than one-fourth, **America** (chiefly the United States and Canada) about one-sixth, and **Australia** and **New Zealand** one-eighteenth. The **rate of consumption per head** of population in the **United Kingdom** is about 6 lbs. a year; and this proportion is even exceeded among the people of **Australia and New Zealand**. The Dutch, who were the first to introduce tea into Europe, still consume a considerable amount relatively to population, and so also do the Belgians; but in other European countries outside of Russia the consumption is insignificant.

C. Tropical Products

280. COFFEE. The coffee of commerce consists of the seeds (the so-called '**beans**') of several species of trees or shrubs, chiefly of one species known to botanists as *Coffea arabica*, Linn., which if left to itself grows to the height of twenty-five or thirty feet, but in cultivation is frequently kept down to the height of from three to eight feet in order to facilitate the gathering of the fruit. The seeds are enclosed in dark cherry-red pulpy berries, each of which usually contains two. The tree comes into full bearing in six years, and remains profitable

[1] Little progress was made down to 1901.

for from thirty to forty years, after which the soil is worn out. The best soil for the coffee-tree, as in the case of tea, is said to be virgin forest land rich in vegetable remains, the accumulations of past ages. A warm and moist climate is required for it, but the heat must not be excessive. An almost ideal climate for coffee is found in Yemen (716), the home of the original Mocha coffee. Here, winter and summer alike, a thick mist ascends every morning from the low grounds on the coast to the slopes on which the coffee is grown. About midday the plantations themselves become enveloped in mist, which lasts till after the time at which the greatest heat of the day is usually experienced elsewhere, and then disappears. So regular is this occurrence that in certain places there are scarcely twenty days in the year on which the mist fails to rise. By night, on the other hand, the air ascending from the hot plains helps to prevent an excessive lowering of the temperature, so that we have as it were a 'hothouse culture with natural self-regulating arrangements.'[1]

281. For the most part coffee-trees, at least when young, must be cultivated either **under cover or under the shelter of trees better fitted to stand extreme heat.** Bananas and erythrinas are frequently grown for this purpose, and in Brazil a tall, coarse pea, which enriches the ground with valuable manure when it dies down, is often planted with the same view. On the other hand, the coffee-tree **cannot stand continued frost**; and though it has to endure occasional frosts in Paraguay, in most coffee-growing countries the mean temperature of the coldest month is above 52° F., and the mean minimum temperature about 42½°. On this account, its range in latitude is more contracted than that of tea (271*a*). Coffee, indeed, is not grown to any great extent outside of the tropics, although the most important place of production, the coffee-region of Brazil, lies just beside the outer limit of the torrid zone.

282. Even within the torrid zone, the cultivation of coffee, though practised in almost all countries except China and the greater part of Indo-China, is generally **restricted to comparatively limited areas**; the reason of which is that coffee is a product grown almost solely as a mercantile commodity, that is, for consumption outside of the regions in which it is produced, and, at the same time, is one that demands a large amount of **labour** in preparing it for the market. Till near the close of the nineteenth century its cultivation in Brazil was carried on mainly by means of slaves; and in Java most of the coffee was formerly grown in government gardens by forced labour.

283. The preparation which the coffee-beans have to undergo before they are ready for the market consists in their separation from their coverings and the processes of drying and 'curing.' In making the finest kinds of coffee the berries are, first of all, pulped, or stripped of the outer pulpy covering, in a machine specially devised for the

[1] Eduard Glaser, in Petermann's *Mitteilungen*, 1886, p. 34.

purpose. The **curing** process which then follows consists in exposing the beans to the sun for six or eight days; and as the beans after being pulped are extremely sensitive to injury from rain or dew, great care must be taken during this stage to protect them from these influences. In consequence of this, both in Brazil and Java the great bulk of the coffee-berries are dried unpulped, it being found difficult to get the necessary care bestowed on drying the pulped berries by the labourers of these places. The coffee so made is of inferior quality. When cured the beans are, in most coffee districts, sent to coffee-works erected in the larger towns or the seaports to undergo further processes of preparation. First, the beans have to be **hulled** or **peeled**—that is, divested of two coats in which each of the beans after pulping is still wrapped. The machinery required for this is too expensive to be found on ordinary plantations. The last processes that have to be performed before the coffee is ready to be put in bags for shipment are **winnowing, grading,** and **sorting,** the beans being sorted not only according to quality but also according to size, since beans of the same size can be more equally roasted before being ground.

284. The use of coffee as a beverage appears to have been very limited till within the last two or three hundred years. The oldest work known to have collected traditions regarding the origin of the practice is an Arabic manuscript belonging to the year 1587; and from this it would appear that the **original home of the coffee-tree** is to be found in the southern parts of the **highlands of Abyssinia,** where it is undoubtedly a native. Thence it was introduced into south-western Arabia, and through the Arabs it became known to Europeans. It is to this fact that the tree owes its specific name of *arabica,* while the generic name, and the ordinary name of the plant and its product, is derived from that which was given to it by the Arabs, and this again is possibly derived from Kaffa, the name of one of the highland districts of Abyssinia whence the tree was originally brought. The introduction of coffee into Arabia must have taken place at least as early as the eleventh century, but even in the middle of the sixteenth century the beverage was still unknown at Constantinople. About a century later still (in 1652) the first coffee-houses were started in London, and these soon became favourite resorts of the wits and men of letters of the time; but in England the drinking of coffee was gradually given up to a large extent in favour of tea, which was introduced even more recently (271). On the mainland of Europe, on the other hand, coffee has come more and more into favour, especially among the nations of Teutonic race; and it is also largely consumed among the people of the United States. **Relatively to population, the largest consumption of all is in Holland,** which is a natural consequence of the extensive commerce between the home-country and its coffee-growing possessions in the East. In that country the total consumption of coffee has amounted in recent years to nearly 20 lbs. per head; in Belgium it is

about half that amount; in Germany, Sweden and Norway, Switzerland and Denmark, it is generally upwards of 5½ lbs. per head; and in the United States the consumption per head amounts to about 10 lbs. The total consumption of coffee all the world over is still rapidly increasing. The average amount of the total annual export from all coffee-growing countries in the years 1852–62 is estimated to have been about 315,000 tons; in 1862–72, 372,000 tons; in 1872–82, close upon 500,000 tons. The average production in 1884–88 was estimated at about 640,000 tons.[1]

284a. The following table shows the proportion of this total furnished by the principal coffee-producing countries:—

—	Per cent. of total export			Per cent. of total production, 1884–88[1]	
	1852–62	1862–72	1872–82		
Brazil	52·0	47·4	50·8	Brazil	63·1
Java	20·1	16·7	14·3	Dutch E. Indies	10·3
Ceylon	8·7	12·4	7·5	Central America	8·0
Hayti	4·0	4·0	5·4	San Domingo .	4·2
Venezuela	3·9	3·9	5·2	Venezuela . .	3·3
British India . . .	1·7	4·2	3·6	Porto Rico . .	2·5
Sumatra and Celebes	3·6	3·6	3·0	British India .	2·0
	94·0	92·2	89·8		93·4

285. Brazil, which now, as the table shows, ranks first, gained importance on account of its coffee-production only in the nineteenth century. The tree was introduced into northern Brazil early in the eighteenth century, but not till about fifty years later into the region where it has since flourished so well. The coffee-producing region in Brazil lies between about 21° and 24° S., and is divided into two zones, one of which is traversed by a system of railways connected with Rio de Janeiro, and the other with a system connected more directly with the more southerly seaport of Santos. The height at which the tree is grown is, in general, from about 600 to 2,500 feet above sea-level. The soil is the characteristic red soil of Brazil (52), and, for coffee-growing as for tea-growing (272), it is thought that the redder it is—that is, the richer in iron—the better. The cultivation and general treatment of the tree is in general very defective, chiefly in consequence of the difficulty of obtaining labour. Where the trees are planted on the slopes of hills, no terraces are formed, and hence there is an enormous loss of soil through the denudation of the hill-slopes by the rains (920). When the harvest time arrives, the labourers, instead of picking the ripe berries as in Java, strip the branches, thus carrying away ripe and unripe berries indiscriminately. On the other hand, every care is taken in the final preparation of the cured berries for the market, the best machinery being found on the plantations for

[1] On the average of the years 1904-5-1908-9, 2,735,000 tons, of which 72 per cent. in Brazil.

the purpose, since it is now the great aim of the Brazilian planters to reduce the necessity for hand-labour as much as possible. On this account the Brazilian coffee, which was formerly little esteemed in the markets of the world, has been steadily rising in value.

286. The introduction of the coffee-tree into **Java** dates from 1650, when it was carried by the Dutch from Arabia. On that island the coffee-plantations are generally at the height of from 2,000 to 4,000 feet above sea-level, and there the coffee-trees have the advantage of a soil rich in vegetable mould, which is absent in Brazil (49). Formerly about two-thirds of the coffee grown in Java was grown on government plantations, but of late years the production of the private plantations has been pretty steadily and rapidly advancing.

287. In **Ceylon**, the cultivation of coffee (which was introduced into the island when it was in Dutch hands, in the seventeenth century), after rapidly extending during many years, has rapidly declined since about 1880. This is partly due to the fact that during the prosperous period for coffee-growers plantations had been established too rashly, and in many cases in unsuitable situations, but chiefly to the ravages of insects and fungi (83*a*). Most of the coffee-plantations have consequently been abandoned in favour of tea and other cultures.[1]

288. The figures in the table in par. 284*a* show a more satisfactory state of things in **India**. The cultivation of coffee is said to have been introduced into that country about two centuries ago, by a native Mohammedan on his return from a pilgrimage to Mecca; but it is only since about 1840 that it has spread with any great rapidity. It is now increasing every year, principally among the virgin forests on the eastern, and therefore more sheltered, slopes (729) of the Western Ghâts, to the south of about 15° N. The most desirable elevation on these mountains is from 2,500 to 3,500 feet above sea-level. The tree is also cultivated on much lower ground further east, but it is nowhere grown with success in northern India.

289. Among the minor areas of coffee-production, those which have shown the greatest increase since the middle of the nineteenth century, are **Mexico** and **Central America** (more particularly **Costa Rica** and **Guatemala**). The African export is likewise rapidly increasing; and here it may be mentioned that the State of **Liberia** gives name to a species of coffee (*C. liberica*, Hiern.) which is valuable from the fact of its being suitable to unsheltered low grounds even in equatorial regions,[2] and being not so readily attacked by the fungus which has ravaged the plantations of Ceylon. It has, for that reason,

[1] In 1898 the extent of the coffee-plantations of Ceylon was less than 9,000 acres, against about 270,000 acres in 1877. The export declined from 100 million lbs. in 1877 to 11 millions in 1900.

[2] Liberian coffee can stand temperatures of over 104° F., whereas the highest temperatures to which the Arabian coffee can be exposed with safety are from 87° to 94° F.

been introduced into Ceylon and other coffee-growing countries. Egypt, which, when coffee was first introduced into Europe, was one of the principal sources of supply, now furnishes coffee no longer; and the Arabian export is relatively small. Jamaica, Colombia, Surinam, the Philippine Islands, and the Sandwich Islands all produce more or less coffee, which can also be grown on the eastern slopes of the highlands of Queensland.

290. CACAO. Cacao, or cocoa, as it is more frequently but rather unfortunately called, is the product of a tropical American tree *Theobroma cacao*, L., not to be confounded with the coco-nut palm (319, 331). The tree comes into full bearing in twelve years (in the most favoured regions earlier) and continues to yield good returns for about thirty years, after which the yield begins to decline. The form in which it enters into commerce is that of **cacao-beans** or chocolate nuts, which are the seeds contained, to the number of thirty to fifty, in a red or green fleshy fruit from six to ten inches in length. These beans or seeds, which form an important article of diet among the natives of tropical America, are composed to the amount of half their weight of a fat known as **cacao-butter**, which has the valuable property of never becoming rancid, however long it is kept. The extraction of this fat has become a considerable industry in Germany. Being rather difficult of digestion, however, this fat is generally removed, as far as possible, in preparing the well-known cacao-powder or cakes of chocolate. Among the constituents that remain are flesh-forming compounds, on account of which cacao is highly esteemed for its nutritiousness.

291. Before entering into commerce the cacao-beans have, like those of coffee, to undergo a **preliminary treatment**, and the quality of the article depends greatly on the care bestowed on the necessary processes, the price of well-prepared beans being often more than double that of beans prepared in a more slovenly fashion. The first process is one for setting up **fermentation**, which removes a disagreeable bitter flavour, destroys the power of germination in the seeds, and prevents mustiness. The best cacao-beans are fermented for a period of five or seven days, by placing them in a heap along with plantain or other green leaves—a process during which so much heat is developed that the hand cannot be held in the heap for an instant. Afterwards the beans are dried in the sun, and they are then ready for shipment. When roasted and split, or broken, these beans form the 'cocoa nibs' of the shops.

292. The cacao-tree succeeds best under a higher temperature than coffee, and requires a great deal of moisture and a considerable depth of soil—much greater than that necessary for sugar. It therefore generally grows nearer the equator than coffee, and mostly on low grounds. Yet it as well as coffee is liable to suffer from direct exposure to the rays of the sun, and is hence mostly grown under the shade of other

trees (322*a*). The district which yields the largest quantity of this product, the low grounds of **Ecuador**, in the neighbourhood of Guayaquil, is within two or three degrees of the equator; and those which rank next in this respect—the Portuguese island of **St. Thomas** in the Gulf of Guinea, the coast of **Venezuela** and **northern Brazil**, **Trinidad**, Grenada, Ceylon, and Java—are not more than thirteen degrees from that line. Cacao is, however, also grown in Mexico, not far from the tropic of Cancer; and to a small extent also in the island of Cuba. The cultivation of cacao in the Old World is of recent date, but it is now rapidly increasing in the two East Indian islands mentioned.

293. Cacao became known in Europe early in the sixteenth century, and hence before either tea or coffee; but **Spain**, where it first became known and acquired favour, is the only European country in which it is preferred to all similar beverages. There it is regarded almost as a necessary of life, as tea is with us. The consumption of cacao per head in Spain and Portugal is about six times as much as in any other European country. France comes next in this respect, and Spain and France are the chief seats of the manufacture of chocolate.

294. RICE. Rice is the characteristic grain-crop of the plains in the monsoon area of the tropical and sub-tropical parts of south-eastern Asia (39, 697). There are many varieties of this crop, some of which require very different conditions from others; but those which are most abundantly produced not only demand a high summer temperature, but have to be grown in fields capable of being flooded at certain stages of their growth; and it is these conditions which are afforded in the great river deltas and low-lying seaboard tracts subject to inundation during the summer rains of the area referred to. The fields in which the rice is grown are embanked to retain the water as long as may be needed, and where not sufficiently level by nature are carefully levelled by art; and if the rains or the overflow of rivers are not sufficient to inundate the fields, the necessary water must be furnished by irrigation. The amount of flooding required or capable of being endured varies at different stages of growth. 'While the seedlings are in an early stage of growth, two inches of water are ample; but when the stem is strong, high floods are almost unable to drown it.'[1] During flooding growth is astonishingly rapid, as much as nine inches having been known to be added to the height of the stalk in twenty-four hours.

Of the numerous varieties of rice some ripen at one period and others at another, so that it is said to be possible for the owner of an estate in Bengal, with a mixture of soils suited to different varieties, to have as many as five crops in the year. Two rice-harvests in the year are almost universally obtained in Bengal, and frequently two crops are taken from the same field.

[1] Hunter's *Gazetteer of India*, 2nd ed. vol. vi. p. 485.

295. From the highly peculiar conditions under which rice grows, it follows that where grown at all it is grown to the exclusion of almost every other crop; and outside of the regions above indicated, where the surface and climate are specially adapted to this form of agriculture, the cultivation of rice is for the most part locally restricted to small areas presenting exceptional facilities for artificial inundation. There are, indeed, certain varieties of rice, known as upland or hill rice, which thrive on a drier soil, and in India often ascend to an altitude of 8,000 feet; but these varieties make up only a comparatively small proportion of the rice-culture of any country.

296. Yet, notwithstanding this local restriction of the rice-crop, it is probable that no other grain forms the staple food of so large a part of the human race, for there is, it is said, no other crop which yields so large an amount of food from a given area of land; and hence the lowlands of Asia adapted to this crop are the most densely peopled parts of that continent, and among the most densely peopled areas of the world. Nevertheless, the statements made as to the number of people living chiefly or almost entirely on rice are mostly exaggerated. Sometimes it is asserted that these make up fully one-half, more commonly about one-third, of the human race; but the probability is that even the lower of these estimates is much too high.

297. Japan, the Philippine Islands, the Sunda Islands, and Indo-China are probably the regions in which the great bulk of the entire population live mainly on rice. In India and China there are certain regions, and these in many cases the most populous, where rice is likewise the mainstay of the inhabitants. Still it is estimated that, if we take British India as a whole, only about one-third of the population is rice-eating, and, since the native states lie mainly outside of the regions suitable for rice-cultivation, it may safely be inferred that a much smaller proportion of the inhabitants of these states live on rice.

298. Relatively to this vast consumption, rice does not enter very largely into the commerce of the world. The great countries of Asia for the most part supply their own wants as regards this commodity within their own borders, and the trade in rice is hence principally a home trade. The density of population in most of the great rice-producing regions of the world does not allow of any great surplus for the commerce with Europe and America, and the supplies for these parts of the world are mainly obtained from one comparatively small district, Burma, which is the least densely populated of all the great rice-growing regions of the world. Of the total export of rice from British India, between 60 and 70 per cent. is from Burma, although the rice-fields there cover only about one-sixth of the area of those of Bengal. In some years Japan has ranked next after Burma in the amount of rice which it has supplied to Europe, but as a rule the Japanese export is exceeded by that of Bengal and Madras. Besides these countries Cochin-China and Siam are the only ones that furnish

any considerable supply to Europe. Rice is grown here and there in southern Europe (615), above all in Italy (Piedmont, Lombardy, and Venetia), so that rice is among the principal Italian exports of home production. It is also cultivated in the United States (894).

299. **MILLETS.** This name is given to several grain-crops, the most important of which are tropical. The two kinds most largely grown are the Great Millet (*Sorghum vulgare*, Pers.) and the Spiked Millet (*Pennisetum typhoideum*, Rich.). They are both among the leading crops of India. Great Millet is also largely grown in Africa under the name of durrah. It is sometimes known as Guinea corn. Neither product enters largely into the commerce of the world. A species of sorghum is pretty largely cultivated in the United States and elsewhere for green fodder. (See also 309.)

300. **MINOR FARINACEOUS PRODUCTS.** Tapioca is derived from the long tubers of the manioc plant (*Jatropha Manihot*, L.), a native of Brazil, but now largely cultivated elsewhere in the tropics of the Old World as well as the New. The tubers, before being subjected to heat and pressure, are highly poisonous, but the meal, a granular substance derived from them, and known as tapioca or cassava, according as it results from slightly different modes of treatment, is wholesome and nutritious. This meal forms a staple article of food among the people of Brazil, but it is imported into this country chiefly from the West Indies, and from the East Indies by way of Singapore. Sago is obtained from the pith of palms of the genus Sagus, principally *S. Rumphii*, Willd., and *S. laevis*, Reinw., largely cultivated in the eastern half of the Eastern Archipelago, including Borneo, whence it is imported by way of Singapore in sacks made out of the leaves of the palm itself. So easy is the cultivation of the palm, and so simple the mode of preparing the sago from the pith, that ten days' labour is estimated to suffice for the obtaining of enough food from this tree to last a man for a year. A single family is able to attend to a plantation containing 400 trees. West Indian sago is the produce of cycads. Arrow-root is derived from various sources. That which is distinguished as the true arrow-root is obtained from the rhizome of *Maranta arundinacea*, L., a native of tropical America, but now cultivated also in the Old World. This arrow-root is chiefly obtained from Jamaica and the Bermudas. Other kinds are derived from India and elsewhere.

301. **SUGAR-CANE.** The sugar-cane belongs botanically, like the cereals, to the family of the grasses, but its seed or grain is commercially of no value, and the plant is cultivated solely for the sake of the juice which is found in its stem, and which yields sugar. It is a tall plant, growing to the height of from ten to fifteen feet, and some of the stalks attain a thickness of more than an inch. Every year these stalks are cut down just before flowering, but the root-stock is perennial, and continues to throw up fresh shoots every year in sufficient quantity to be remunerative for thirty years in succession. This is one advantage which it has over its great modern rival, sugar-beet (190), and it likewise surpasses this latter sugar-plant in the ease with which it can be grown, and in the relative amount of sugary juice afforded by a given weight of raw material, as well as in the relative amount of sugar capable of being derived from the juice. In cultivation the sugar-cane requires hardly any attention, and an acre of ground under this plant is calculated to yield on an average not far short of twice as

much juice as one under beet. The range of the sugar-cane in latitude is wider than that of coffee, but not so wide as that of tea. In the northern hemisphere it is grown successfully to the north of lat. 37° in the south of Spain, and in the southern hemisphere, in Natal and New South Wales, to about lat. 30° S. A moist soil being required for sugar-cane, the situation in which it is grown is very different from that of tea or coffee, and more like that adapted for rice, the cultivation of which has in many cases given place to sugar.

302. Originally a product of eastern Asia (probably of Indo-China and the valley of the Ganges), the sugar-cane became generally known in the west only in comparatively recent times. The cane itself, and the knowledge of the mode of extracting sugar from it, would appear to have been introduced by the Arabs first into Egypt, and then, in the ninth century, into Crete, Sicily, and other islands of the Mediterranean. Subsequently it was introduced into Spain, which is now the only part of Europe where, under the protection of the government, it still flourishes. At the present day the cultivation of the cane is spread over all tropical and many sub-tropical countries, including the islands of the Pacific, and the chief area of production, so far at least as the commerce of the world is concerned, is now in America (the West Indies, Guiana, and Brazil). In India the total production for native use (in a scarcely refined condition) is enormous, probably three times as much as that of Cuba; but the production for export is surpassed by that of many other countries. In the Old World, Java, the Philippine Islands, China, Japan (Formosa), Mauritius, and Egypt are the chief exporters of cane-sugar.

303. THE SUGAR INDUSTRY. Sugar, now the cheapest of all luxuries, and, indeed, regarded as a necessary of life by the very poorest in almost all parts of the world (8), was a substance unknown to the classical nations of antiquity. There could be no more signal illustration of the results of the development of commerce and the stimulation of agricultural and mechanical industry due to commerce. Even about four hundred years ago refined sugar, in the form of the white crystalline substance with which we are familiar on our tables, was still an unknown article. The invention of the process of refining sugar into the form known as loaf-sugar is ascribed to a Venetian about the end of the fifteenth or beginning of the sixteenth century. As late as the beginning of the eighteenth century sugar was still a comparative rarity in Europe. At that date the total amount consumed on the continent in one year is estimated to have reached only about 50,000 tons. Now the amount annually consumed in the United Kingdom alone is more than thirty times as much. The consumption all the world over is still rapidly increasing. Next to rice, cane-sugar is the bulkiest of tropical commodities (see note 2, p. 140).

304. The effect of this growing demand has been to bring to light new sources of supply, to improve the system of agriculture employed

in producing the crops from which the new supplies are obtained, and, above all, to lead to the perfection of the processes by which the sugar is extracted from the plant. Down to the nineteenth century the sugar-cane was almost the sole source of supply of the sugar consumed in Europe. The presence of **sugar in beet-root** was **discovered** by a Berlin apothecary named Marggraf, as far back as 1747. Before the close of the same century another Berlin chemist, named **Achard, devised a method of extracting the sugar** from beet; but the first attempts to do this were not commercially successful. At a later date great improvements were introduced in the method of extraction by the French Comte de Chaptal, and after 1820 the making of beet-sugar became firmly established as a branch of national industry in various countries in Europe. Since then sugar-beet has become every year a more formidable rival to sugar-cane, and in considering the development of the sugar industry it will be instructive to compare the relative advantages of these two rivals.

305. On the side of sugar-cane there is the advantage of easy culture and relative richness in sugar (301), and likewise the fact that it is grown in tropical and sub-tropical climates where labour is at its cheapest. Beet suffers under the disadvantage of requiring high cultivation (more especially plentiful supplies of potash manure), of requiring to be re-planted year by year, of being less rich in sugar, and of being grown where labour is relatively dear, at least in comparison with the countries of the sugar-cane. On the other hand, beet has the advantage of being grown where population is dense, and where accordingly the market is close at hand both for the raw material used in the refineries and also for the manufactured product; where, too, in consequence of that density of population, manure is abundant, or the advanced state of commerce renders it easily procurable; and where the abundance of capital, and the consequently low rate of interest on money, favours the erection of the best machinery for dealing with the raw material. Moreover it has the further important advantage of yielding a refuse material of much higher value than that obtained from the sugar-cane. The canes after being deprived of their sugary juice are chiefly used for fuel; but the refuse beet, the **beet-pulp**, as it is called, is **a valuable food for cattle**—a circumstance of special importance in thickly peopled countries. The mention of these conditions affecting the cultivation of sugar-beet enables one to understand why the plant cannot be cultivated with success in all parts of the world in which the climate is suitable. It is enough to point out that in the United States, for example, agricultural labour is relatively much dearer than in Europe, the interest on money in most of the regions in which beet could be grown is much higher, and cattle-food relatively of much less value. (See, however, 190.)

306. As affecting the competition between sugar-beet and sugar-cane at the present time, probably the most important factor in

deciding on which side the general advantage lies is the superiority of the methods and machinery for extracting sugar from the beet. In the case of the sugar-cane, the stems of the plant are as a rule merely crushed between rollers which still leave in the cane a considerable proportion of the juice. The juice that is pressed out is boiled and otherwise treated, part of the substance then forming the crystals of sugar, while the remainder flows away in the form of a syrup known as molasses. From the country of production cane sugar is usually exported in an unrefined condition, in which it is called raw sugar, and the raw sugar is further treated and refined, more syrup flowing away during these further processes. In the case of sugar-beet, the roots containing the sugar are first treated in one of two ways, either of which extracts from their substance a larger proportion of the juice contained in them than is usually derived from the sugar-canes. One method is to subject them to the action of powerful presses; but a still better method is that known as the diffusion process, the invention of a German named Robert, but improved and first made practically useful in France (by Charles, and afterwards by Peret of Roye). According to this process slices of the beet-root are subjected to the action of hot water either in a number of different tanks or in one continuous cylinder, but in either case in such a manner that the water ultimately gets thoroughly saturated with juice. The after-treatment of the beet-juice differs in some respects from that of cane-juice, but is in the main similar. The general result of the improvements that have been brought about in the cultivation and treatment of sugar-beet in Germany, where this branch of industry is most highly developed, is such that whereas in 1836–37 18 cwts. of beets were required to produce 1 cwt. of raw sugar, only between 10 and 11 cwts. were about 1882[1] needed for that purpose. A part, but only a small part, of this improvement is to be ascribed to the advance of agriculture increasing the proportion of sugar present in the beet. By far the greater part is due to the more complete extraction of the juice.

307. Till lately the cane-growers relied solely upon the greater richness of their raw material to enable them to compete with the producers of beet-sugar. They are now, however, everywhere feeling the increasing severity of the beet competition, for the production of beet-sugar is advancing with much more rapid strides than that of sugar from the cane. Though, if we take the production of India and China into account, the total amount of sugar produced from the cane must be considerably in excess of that derived from beet, yet, if we look only to that which enters into the commerce of the western world (Europe and North America), beet, according to the best estimates that could be formed, had already overtaken the cane in 1885.[2] Beet-

[1] Now (1901–2) reduced to about 7 cwts. or less in Germany and Holland, 8 cwts. in Austria-Hungary and France, rather more than 8 cwts. in Russia.

[2] In 1900 the production of beet-sugar was estimated at 5,950,000 tons, against 2,850,000 tons of cane-sugar, excluding, however, the large but uncertain production of India (? 3,000,000 tons).

sugar then made up only about half [1] the raw sugar imported into the United Kingdom, but in most other European countries the consumption of beet-sugar already prevailed. In order to meet beet competition the method of diffusion has been tried in some places (as in Java) with the cane. An obstacle to the employment of the process arises from the high price of coal in most cane-growing regions, but it may be suggested that in tropical countries the heat of the sun might with the aid of burning-glasses be employed to evaporate the water used in the diffusion process (76). An economy has been effected by a change of system in some cane-growing districts. Instead of each planter extracting the sugar from his own cane, different estates are connected with a single sugar-factory, the juice from the canes being pumped through pipes leading to reservoirs belonging to the factory. This is known as the *usine* or factory system. Even this method does not produce the most economical results unless the separate estates are large enough to be equipped with the best crushing machinery. Otherwise it is found best to convey the cane itself to the central factory to be crushed there.

308. Here it should be mentioned that there are few industries the pursuit of which has been more generally affected by government regulations. In all the chief beet-sugar producing countries of Europe special fiscal regulations have been made with a view of encouraging that industry.[2] In some cases a direct bounty has been granted on exports. In other cases a drawback on exports has been allowed at such a rate as to favour exportation of sugar. In all cases a protective customs duty has been imposed. As the law stood in France at the beginning of the twentieth century a small direct bounty was granted on exports, but the encouragement to the industry was given mainly in connection with the revenue raised on production. The tax on home-consumed sugar was 60 francs per 100 kilos., but the sugar manufacturer paid the full tax only on the assumption that nearly 18 cwts. of beet were required to produce 1 cwt. of raw sugar. For any production in excess of that rate the taxation was considerably reduced. Now, as can be seen from note 1, p. 140, the yield of sugar is in fact much above the proportion indicated. The law was thus effective in accomplishing its two main ends of increasing the production and quality of sugar-beets produced in France (mainly in the five northernmost departments) and the manufacture of sugar. In Germany and in Austria-Hungary at the same date direct bounties on the export of sugar were also granted, but these were likewise of small amount (at most under 2*s.* 6*d.* a cwt.), but a heavy protective import duty, amounting to twice the duty charged on the home consumption of sugar, enabled the manufacturers of raw sugar and the refiners in both countries to organise the industry in such a manner as practically

[1] In 1900 less than 10 per cent.
[2] See a paper by M. Yves Guyot, *Jour. Statist. Soc.* June 1902.

to increase greatly the bounty on the industry. This was by what was known as the Cartel System, adopted first in Austria-Hungary and afterwards in Germany. Under it the manufacturers of raw sugar on the one hand and the refiners on the other had organised themselves into separate combinations, and while the manufacturers undertook to deliver no sugar for home consumption except to the refiners, the refiners agreed to pay a fixed price to the manufacturers for all such sugar. It was thus found possible to maintain the home price of raw sugar at such a level as to aid in recouping losses that would otherwise be made on export. In Belgium and Russia bounties were paid on export indirectly. The consequence of such regulations was that in all the countries mentioned the production of beet-sugar was stimulated to a degree greatly in excess of that corresponding to the geographical conditions. The price of the sugar on the world-market was excessively lowered. A heavy burden rested on the sugar-consumers and tax-payers of the bounty-paying countries, and English consumers formed almost the sole large population that benefited. Hence, in this country there was a consumption of upwards of 80 lbs. of sugar per head, as against about 34 lbs. in Germany and only 17½ lbs. in Austria-Hungary. Repeated international efforts were consequently made to get rid of the system, and at last a conference composed of representatives of the interested powers met at Brussels in 1901–2, and adopted a convention under which all direct and indirect bounties on sugar are to be abolished and no surtax (=protective tax) of more than 6 francs on 100 kilos. of sugar or 5 fr. 50 cents. on raw sugar is to be imposed.[1] In the United States sugar is protected by import duties amounting in the case of refined sugar to about 9*s*. a cwt.

309. Besides the two great sugar-producing plants, sugar is obtained in greater or less quantity from various other sources. In the eastern parts of the Canadian Dominion and in the north-eastern states of the Union, **sugar** is largely **obtained from** a juice which flows out on tapping the trunk of various species of maple, and above all the **sugar-maple** (*Acer saccharinum*, Linn.). From this source is obtained a small proportion of the native-grown sugar of the United States. In the same country a species of **sorghum** (299) is used in making sugar, but in general all that is obtained from it is a sugary syrup or molasses. Experiments in the making of sugar from this source have been long continued at Fort Scott, in Kansas, and they are said to have proved at last so far successful as to ensure an economic profit. **Maize** also has long been experimented on with a view of obtaining this article from its stem. **In tropical countries** sugar is largely obtained from **various species of palms**—in India from the Indian date-palm, the Palmyra palm, the coco-nut palm, and the sago-palm.

[1] This convention comes into operation on September 1, 1903. For the principal provisions of the legislature in France, Germany, and Austria-Hungary, with a view to this fact see the *Board of Trade Journal*, No. 336, p. 259.

310. Relatively to population, the United Kingdom and the British Colonies in Australasia are by far the largest consumers of sugar. Next follows the United States; and Cuba, the Argentine Republic, and Brazil are all estimated to have a larger consumption of sugar per head than most of the States of Continental Europe.

311. CINCHONA. Cinchona is the name of a Linnæan genus of tropical trees, several species of which yield a bark invaluable in medicine; so that no other commodity enters so largely into the commerce of the world solely on account of its medicinal uses. The bark is used medicinally in the form of extracts, the best-known of which is quinine, or compounds made from these extracts. The medical uses are very various, but it is chiefly as affording a sovereign **remedy for the malarial fevers** incident to tropical climates that this bark is so highly prized. The species of Cinchona are all natives of the eastern slopes of the Andes, from about 7° N. to 22° S., occupying, generally in scattered groups, a belt of from about 8,000 to 10,000 feet above sea-level, a belt in which they are exposed to copious rains (920), enjoy a tolerably constant temperature (40), and plenty of sunshine. The species most valued for their bark, among which are *Cinchona succirubra*, Pav., yielding the **red bark** of commerce, *C. calisaya*, Wedd., and *C. ledgeriana*, Moens, yielding the more valuable **yellow bark**, and *C. officinalis*, L., flourish best when grown within eight or ten degrees of the equator at the height of from 4,000 to 7,000 feet above sea-level, where the mean temperature is from about 55° to 70° F. In higher latitudes they are, of course, confined to a lower elevation.

312. The great value of this bark has led to numerous attempts to introduce the trees into other parts of the world than those to which they were originally confined, and some of these having been remarkably successful have caused great changes in the chief sources of supply, and within recent years have led to a great reduction in the price of the bark. Originally the region from which it was introduced into Europe belonged entirely to the domain of the old Empire of Peru, and subsequently to the Spanish viceroyalty of Peru; and hence it became known by the name of **Peruvian bark**, which is still very frequently applied to it. After the establishment of the various South American republics, that of **Colombia** furnished the chief supply. The first attempts to introduce the tree into the tropical parts of Asia were made by the Dutch. The first tree was **introduced into Java in 1852**, and a few years later the cultivation of the cinchona was a successful government industry on that island, where it is now prosecuted by private individuals as well as by the government. **To India** the tree was brought direct from South America, by Mr. (now Sir) Clements Markham, in 1860. A government cinchona plantation was soon after established on the **Nílgiri Hills**, and a second was afterwards set agoing in **Darjíling**, in lat. 27°, on one of the rainiest parts of the Himalayan range. These establishments, however, did not greatly affect the European supplies

of the bark, since almost all their produce is used in India in the form of a cinchona febrifuge. Besides the government establishments, private plantations have been set up in India in the southern part of the **Western Ghâts** and on the mountains of **Travancore**.

313. But it is the **Ceylon** plantations which have had most effect on the international commerce in this drug and on its price. Down to about 1880 Colombia remained the chief source of supply of this bark for the London market (which is the most important of all as regards this commodity); but so rapidly was cinchona-cultivation extended in Ceylon that the British imports of the bark from that colony increased from 7,452 cwts. in 1881 to upwards of 115,000 cwts. in 1886. During the same period the import from Colombia sank from upwards of 70,000 cwts. to 686 cwts.; and whereas in 1881 the 70,000 cwts. imported from Colombia were valued at upwards of 1,000,000*l*., the 106,000 cwts. imported in 1886 from Ceylon were valued at only 565,000*l*. Since 1886 the supply of bark from that colony has declined both absolutely and relatively.[1]

314. Among other parts of the world into which cinchona cultivation has been successfully introduced are **Jamaica**, where *C. officinalis* thrives admirably on the Blue Mountains, at the height of 5,000 feet and upwards, and **Madeira**, in about 33° N., the highest latitude at which its cultivation has yet proved a success. The *C. succirubra* succeeds on that island at an elevation of about 500 feet.

315. **TROPICAL VEGETABLE FIBRES.** Of these the most important (apart from cotton) is **jute**, which is derived from the bast chiefly of two species of a genus of plants known to botanists as *Corchorus*. These are slender-stemmed annuals, from about eight to twelve feet high, cultivated in India, Ceylon, and China, to a less extent in some other tropical countries, as well as Syria and Egypt. In these last two countries the species known as *C. olitorius*, Linn., is cultivated chiefly as a vegetable. The cultivation of the plant on a great scale for the sake of the fibre is almost confined to the northern and eastern parts of Bengal. It is grown on every variety of soil, but by preference on the alluvial sand-banks thrown up by the rivers, for which situation it is peculiarly adapted by the fact that, except in the early stages of growth, it can stand heavy flooding without injury. The fibre, which is extracted from the stem by various processes, including that of retting (193), has long been woven into cloth called **gunny-cloth** by native hand-loom weavers, the cloth being chiefly used for making sacks and packing for cotton, coffee, and other products. Till about 1835 the use of this material in weaving was almost confined to India; but about that date it began to be imported into **Dundee**, where it has risen to be the chief article used in spinning and weaving, especially since the Crimean war (1854–56) temporarily

[1] The decline was largely due to a fall in the price of the bark, but improved methods of cultivation have enabled Java planters to meet this fall with success.

reduced the Russian supplies of flax and hemp, on which the industry of that town to a large extent depended. For a time Dundee was the only seat of jute-factories, but the industry has since spread to other towns of the United Kingdom (especially to such as are also engaged in the linen industry), and still more recently the prosperity of the Dundee jute-manufactures has been a good deal checked by the establishment of factories on the Continent and in India itself. The Indian factories are almost all confined to Bengal, and indeed to the immediate neighbourhood of Calcutta, jute being the Bengal industry which rivals that of cotton in Bombay. Gunny-bags and other coarse packing-materials are still the chief product of the jute-factories. Hence the United States, which exports such enormous quantities of raw produce, takes about half the amount of jute manufactures exported from Great Britain, and Brazil and the Argentine Republic likewise import large quantities. Jute yarn, either alone or in combination with other yarns, is now also employed in the manufacture of various other fabrics, such as carpets, furniture-coverings, curtains, and even plushes and velvets. As it is capable, under proper treatment, of being made highly lustrous, like the flax fibre, it is particularly well suited for mixing with silk.

316. A rival to jute in the American market has sprung up since 1880 in the fibre known as **henequen**, or **sisal hemp**,[1] derived mainly from the thick fleshy leaves of the *Agave sisalana*, Perrine, a native of **Yucatan**, where it is now largely cultivated, partly also from other species of Agave, including the maguey (912). Heneqeun has also been introduced into **British Honduras** and the **West Indies**.[2]

317. Next in importance to jute among tropical fibres in European commerce is **Manila hemp**, so called from the chief place of export (761). It is obtained from the long leaves of *Musa textilis*, Nees, a tree belonging to the same genus as the banana and plantain, found wild on the Moluccas and Philippine Islands, and cultivated chiefly on the latter. The fibre is from six to nine feet in length, and, being separated from the leaf entirely by the ill-paid hand-labour of the natives, is very cheap; and since, though more difficult to work and more brittle than hemp fibre, it is capable of being made into ropes of great tenacity and endurance, it is very largely exported for the purpose. Great Britain alone annually receives this product direct from the Philippines to the value of more than 500,000*l*. A large amount is also imported by way of Hong-Kong and Singapore. The finer fibres are woven by the natives of the Philippine Islands into delicate tissues, and in Europe they are likewise used (often in combination

[1] So called from Sisal, the port of export in Yucatan before the railway was laid from Merida to Progreso (see the map in the section on Mexico).

[2] A rival to henequen for the making of twine, now its principal use, has appeared in one of the chief markets for this commodity, the Argentine Republic, in the form of a fibre derived from a local (Entre Rios) palm called the caranday.

with silk) in making curtains, coverings for furniture, and other fabrics.

318. In Eastern countries (India, China, Japan, and the Eastern Archipelago) fibres derived from the bast chiefly of two varieties of *Bœhmeria nivea*, Hook., a species of plants belonging to the nettle family, have been used from the earliest times in spinning and weaving. The fibres, which are known in India as **rhea**, in the Malay Islands as **ramie**, and to Europeans by the name of **China grass**, are pre-eminent amongst vegetable fibres for strength, fineness, and lustre,[1] and produce an almost silky-looking fabric, called China cloth or grass cloth, which in China is very generally used for the making of summer clothing. Factories for the manufacture of this cloth have now been erected in various European countries, including the United Kingdom, and the plant is now cultivated with success in North Africa, southern and central Europe (in France, even in Normandy), and above all in Mexico (**912***a*).

318*a*. Of all fibre plants China grass is that which seems likely to grow most rapidly in importance for weaving within the next few years. In some trials it proved to be more than twice as strong as Russian hemp, and, being not easily injured by moisture, it is well suited for the making of ropes. Its various qualities render it fit for being used in making, besides ships' cable, all sorts of woven fabrics, from the coarsest to the finest—sail-cloth, table-linen, 'alpaca,' velvet, and even lace and cambric. The chief obstacle to its use at present is its high price, arising from the difficulty with which the fibre is separated. A good machine for the extraction of this fibre is still a desideratum.

319. Of other tropical or sub-tropical fibre-plants it will be sufficient to enumerate some of the more important, since none of them has, so far at least, attained any considerable place in international commerce. A leguminous or pod-bearing plant, *Crotalaria juncea*, Linn., yields from its bast the **sunn-hemp** of India. In the same country the *Hibiscus cannabinus*, Linn., a member of the same family as the cotton plant, is largely cultivated, especially in the north, for its fibre, which is also obtained from the bast, and is known as **Deccani** or **gambo-hemp**. Several trees belonging to the same family furnish a soft silky wool, which, like the true cotton, is an investment of the seeds, but which, being too short for spinning, is used for stuffing cushions and other similar purposes. These are known as **silk cotton trees**, and the most important are *Bombax Ceiba*, Linn., a native of tropical America, *Bombax malabaricum*, DC., a native of India, and *Eriodendron anfractuosum*, DC., a native of India and the Eastern Archipelago, from which latter region the product of this tree has been introduced into commerce by the Dutch under the name of **vegetable down**.[2] The fibres of the leaves of the screw-pine, *Pandanus odoratissimus*, Linn., a native of Southern Asia, Madagascar, and the islands of the Pacific, enter into commerce under the name of **vicua**, or **vacoua**, as a material for coarse sacking. Those from the outside of the stem of the palm known to botanists as *Attalea funifera*, Mart., are exported from Brazil, under the name of **piassava**, as a material for brushes and brooms. Another palm-tree. the ubiquitous coco-nut palm, furnishes, among its numerous other products, the fibre called **coir**, which

[1] *Kew Bull.*, No. 18, p. 146.

[2] Now also known as **kapok**.

is commercially by far the most important of all these minor fibres. The fibre forms a thick matting on the outside of the nut, and is exported from all tropical countries as a material not only, like the piassava, for brooms and brushes, but also the making of door-mats, and even for the making of stair-carpets, and various other purposes.

320. **CAOUTCHOUC, OR INDIA-RUBBER.** Both names are of interest. The first is a South American name, and hence suggests the region whence the first knowledge of the substance was introduced into Europe, and whence still come the chief supplies. It was found in use in various parts of America by the early discoverers. On the occasion of the second voyage of Columbus (1493) it was noted as being used in Haiti for the making of balls. Torquemada mentions in 1615 that it was then derived from a Mexican tree, and used by the Spaniards to waterproof their cloaks. The Portuguese found it in use at an early date in Brazil for the making of syringes (whence its Portuguese name of *seringa*), but the substance and its uses first became generally known in Europe through a paper read to the French Academy by La Condamine in 1736. For more than eighty years after that almost the sole use of the substance in Europe was for the purpose which the second name suggests, namely the rubbing out of pencil-marks. At the present time it would be difficult to say how small a fraction of the consumption of caoutchouc that use represents, so that this second name is a constant reminder of the way in which a great industry may grow out of small beginnings. The 'India' prefixed to the term 'rubber' indicates the source from which the chief supplies of the material were got when its use was limited. The first important extension of the use of caoutchouc was due to the invention in 1823 by **Mackintosh** of **the waterproof** fabric named after him. A still greater extension followed when Goodyear in America in 1842, and independently Hancock in England in 1843, discovered the method of hardening caoutchouc by **treating it with sulphur.** This is known as the process of **vulcanising.** A small proportion of sulphur (5 to 7 per cent.) incorporated with the caoutchouc makes the compound adapted for a great variety of mechanical purposes, such as nearly everybody is more or less familiar with. A larger percentage (30–50) makes the hard black compound known as ebonite, used for a number of other equally familiar purposes.

321. Caoutchouc is the coagulated juice derived from a variety of trees, all tropical. By far the largest supply is obtained from trees of the allied genera Hevea and Micrandra, growing in the forests of the **Amazon Valley**, in Brazil, Bolivia, and Peru, not in clumps, but widely scattered amongst a great variety of other trees, as is usual in well-watered parts of the tropics. The species from which most is obtained is the *H. brasiliensis*, Müll.-Arg. (*Siphonia elastica*, Pers.).[1] The

[1] Next in importance would appear to be the *Hevea lutea*, but the rubber collectors of the upper Amazon region state that they get the rubber from a dozen

rubber derived from all these trees is known from the place of export as **Pará rubber**, and includes all the rubber of the best quality. The trees yielding the best juice are those growing on tracts of land which are annually flooded. Those growing where the roots are always submerged yield too watery a juice, and those that grow on higher ground beyond the reach of floods a juice too viscid. Another Brazilian tree, *Manihot Glaziovii*, Müll.-Arg. (an ally of the shrub yielding tapioca), furnishes **Ceará rubber**, which owes its commercial name to the province from which it is derived. The region to which it belongs is one in which rains may occasionally be plentiful, but is exposed to prolonged periods of drought, the rains sometimes failing altogether even in the rainy season. It grows chiefly on gravelly soils, or soils derived from weathered sandstone or granite. Another Brazilian tree, the *Hancornia speciosa*, Müll.-Arg., growing in the provinces from Bahia to São Paulo, yields Mangabeira rubber, exported chiefly from Pernambuco. It thrives best where there is a well-marked dry season, and flourishes on an otherwise sterile sandy soil. In **Central America** and the northern parts of **South America**, caoutchouc is obtained from *Castilloa elastica*, Cerv. It is the rubber from this tree that is locally known as caucho, the term which has given us the word caoutchouc, but this rubber is of inferior quality, and not adapted to some of the uses to which Pará rubber is put. In **India**, rubber is obtained from a species of fig, *Ficus elastica*, Roxb., the produce of which enters into commerce mainly through the province of Assam, and is hence known as **Assam rubber**; in **Borneo**, from a species of Willughbeia; in other parts of the **Eastern Archipelago**, from *Urceola elastica*, Roxb., in **Africa**, principally from various species of twining plants belonging to the genus Landolphia, but also, in **Lagos** and other parts of west Africa, from *Funtumia elastica* (=*Kickxia elastica*, Preuss).

322. The total supply of caoutchouc was estimated by Scherzer at about 20,000 tons annually,[1] of which about half was supplied by or (from Bolivia and Peru) through **Brazil**. The countries taking the lead in the trade and industry connected with the substance are the **United States** and the **United Kingdom**, but the United States is far ahead of all other countries in the consumption of the raw material. Considerably more than half the British import is re-exported.

322a. Notwithstanding the extraordinarily rapid increase in the consumption of this article, there is no reason to fear any exhaustion

different kinds of trees. The trees are met with only here and there amidst the various other trees of the dense forest amidst which they grow.

[1] About 1882. In 1905 the total production was estimated at about 65,000 tons, about half of which came from or through Brazil. In 1850 the total import of rubber into the United Kingdom was far below 500 tons; in 1870 it had grown to 7,600 tons, in 1900 to 25,600 tons, in 1905 to 28,170 tons. The rapid rise in price (average import price in Great Britain in 1895 11*l.* per cwt., in 1905 17*l.*) gives a better prospect of success in the plantation production of rubber. In 1905 the total extent of rubber plantations in the world was estimated at about 150,000 acres, in 1910 that for Asia alone at 550,000 acres (Ceylon 184,000). Pará rubber trees are planted at the ratio of 100 to 135 per acre.

of the supply. New regions in which Hevea rubber may be collected from wild trees have still to be opened up, and regions that have for the time been exhausted recover themselves after a few years' rest. A tree that has ceased to yield juice is not killed, but in a few years will begin to yield again. Additions are likewise constantly being made to the sources of supply of other rubbers also. There can be little doubt, moreover, that in course of time considerable supplies of rubber will be derived from regular plantations, in which it will be possible by careful tapping to obtain annual supplies of juice from the same trees for many years in succession, and to effect other economies not practicable by the present mode of collection. Experiments have been made with both Pará and Ceará rubbers since 1876 and 1877. Through the authorities of Kew Gardens both trees have been introduced into all suitable parts of the tropics both in the Old World and the New. The Ceará plantations have nowhere given promise of success, but it is otherwise with those of Pará rubber. The attempts made with it in the outer latitudes of the torrid zone (Bengal and Assam) were indeed failures, but in lower latitudes better results have been obtained, and in recent years, more particularly the Ceylon plantations, and still more those on the Malay Peninsula, have yielded such returns as to make them remunerative for local planters at the present high prices for rubber, although it still remains doubtful whether they would pay with expensive European company-management. More experience is still required, however. The yields are very variable and uncertain; as much as 16 lbs. of rubber has been taken from a single tree without injury, but this is quite exceptional. From the oldest Hevea plantation in Perak (at Kwala Kangsa) 88 lbs. have been obtained at one time from sixty trees, most of them only six years old,[1] and in other cases even greater returns have been obtained from trees of the same age. The greatest yield is said to be got from trees at least twenty-five years old. Though large plantations of Hevea may not yet pay, it is urged that this tree should always be grown as the shade tree in cacao plantations, which are suited to the same soil, site, and climate (292). Of other rubber trees, the most promising is the *Kickxia elastica*, which has a great advantage over the species of Hevea in having seeds of great vitality. It is being extensively planted on the Guinea coast and the Kamerun territory, and in the sixth year is said in some cases to yield from 2 to 3 lbs. of rubber. Mangabeira rubber is recommended for cultivation on red soils such as are suited for coffee, but are otherwise not very valuable.

323. Gutta-percha is the hardened juice of several other tropical trees, but the chief supply in this case comes from the East Indies,

[1] See O. Warburg, *Die Kautschukpflanzen und ihre Kultur*, p. 43, and report of a lecture by Mr. H. N. Ridley, director of the Botanic Gardens, Singapore, in the *Imperial Institute Journal*, No. 87, p. 71. For various interesting particulars as to the production and treatment of South American rubber see also *For. Off. Report*, Miscel. Series, No. 580, pp. 9–19.

especially the Malay Peninsula and the Dutch East Indies, Singapore being the chief place of export to Europe. The tree that yields the bulk of the supply is known to botanists as *Dichopsis Gutta*,[1] Benth. Another kind is derived from another member of the same botanical family, the Sapotaceæ, namely from *Sapota Mülleri*, Blume, a native of Guiana. Gutta-percha is used for many of the same purposes as caoutchouc, and is capable in many respects of similar treatment. Mixed with carbon, it can be readily vulcanised like caoutchouc, by the addition of sulphur, either to the soft or hard state. It is very largely employed in the making of telegraph cables as an insulator in which the wires are embedded, and as England has almost a monopoly of this industry, the gutta-percha trade of the United Kingdom receives a great stimulus therefrom. At present the tree is mostly destroyed to obtain the juice, but this is not necessary. It may be tapped and preserved like rubber trees, and beginnings have been made with systematic planting in the Malay Peninsula, British North Borneo, and elsewhere.

D. *Products of Various Climates*

324. VEGETABLE OILS, OIL-SEEDS, AND OIL-CAKE. Almost all vegetable oils are extracted from the fruit or seed. The plants supplying oil vary widely in their character, ranging from small herbs to tall trees. Almost all of them belong to warm countries, that is to say, either to tropical lands or the warmer parts of the temperate zone, or if they are not confined to these regions, are there of most importance for their oil.

325. The **uses** of vegetable oils are various. Some, such as olive-oil, ground-nut oil, poppy, sesame, and cotton-oil, are largely used as **table oils**, for cooking, preserving, &c.; others, including rape, cotton, and olive, are used for **lighting**; others, such as rape, hemp, and palm-oil, are employed in **lubricating machinery**; others are used in **medicine and perfumery**; others in making **candles**; others, known as drying oils, of which linseed is the most important, in **mixing colours** for painting, as well as in various manufactures; very many of them in the **manufacture of soap** (455), which is rapidly becoming the chief use of almost all vegetable oils, except drying, and some of the table oils, seeing that for the other purposes for which oils are required in greatest quantity, lighting and lubricating, vegetable oils are being displaced by the cheaper petroleum products (400).

326. Among vegetable oils, the first place may properly be given to the product of the **olive**. This tree, originally a native, in all probability, of western Asia, is suited rather to a warm temperate than a subtropical climate with dry summers, and the site best suited to it is that which has a dry, and above all a gravelly limestone soil, and is well

[1] Or *Palaquium Gutta*, Burck.

sheltered. These requirements are presented in many parts of the **Mediterranean** region (including Portugal), throughout which (except in Egypt) the tree is highly characteristic. Both in Italy and Spain it is estimated to cover about 8 per cent. of the entire surface, and in the latter country extensive forests composed of it alone cover the southern slopes of the **Sierra Morena.**

326*a*. In the Black Sea region the distribution of the olive illustrates in an interesting manner the influence of climate. The tree is absent from the south of Russia, except on the southern slopes of the Yaila mountains in the Crimea, which afford the necessary protection against cold northerly winds. Under the shelter of the Caucasus Mountains it occurs in Trans-Caucasia, where it grows both wild and under cultivation in many districts. In the north of Asia Minor the olive thrives admirably along the whole coast from Trebizond to Samsun, and in ancient times extended to Sinope; that is, it occupies or once occupied the whole of that part of the coast looking north-eastwards and participating in the shelter afforded by the Caucasus Mountains. It is excluded, however, from that part of the coast which looks north-westwards, and is liable to be swept by cold winds from southern Russia.[1]

326*b*. Outside of the regions considered in the preceding paragraphs, the tree may be grown in many parts of the world, but there are few of these in which olive-oil is an important product. The tree thrives in Mexico, and also in Peru and other parts of South America, where it was introduced as early as 1560; but in these parts its fruit is said to be unfit for use in the extraction of oil. It has long been cultivated with success in **South Australia**, and olive plantations are already so extensive in California that home-grown table olives have already driven the foreign article out of the markets of the **United States.**

326*c*. The production of **olive-oil in Italy,** both for home use and for **export,** is greater than in any other country. In quality, however, the bulk of the Italian oil is inferior to that of **France** (the **Provence oil**), but the **oils of Lucca** in Tuscany and of **Liguria** are unsurpassed. The export of Italian oil is chiefly to **France, which consumes much more oil than it produces,** and has itself little or no export of this commodity. The United Kingdom derives olive-oil more largely from Spain than Italy, and the other countries from which it is chiefly brought to England are Turkey (including Asia Minor and Syria, in some parts of which olives are very abundant), Morocco, and Tunis. There is more inferior oil imported into the British Isles than into France, for in this country the oil is less used than in France as a table oil. The inferior kinds are much used in the making of soap.

327. Olive-oil is now very largely adulterated with cotton-seed oil,

[1] Tchihatchef, *Klein-Asien*, p. 70.

which can scarcely be distinguished from it in flavour, and is, indeed, often substituted for the genuine product of the olive. Cotton-seed is chiefly exported from Egypt, and most largely to the United Kingdom, where the refining of the oil has become a great industry at Hull. In the United States cotton-seed oil is very largely employed as a table oil and for other purposes, and it probably makes up the great bulk of the seed oil imported into the United Kingdom from that country.

328. Linseed, rape-seed and the sesame of commerce are the three principal oil-seeds furnished by India, and they are all exported for the most part before the extraction of the oil. Linseed, as already intimated, is merely another name for flax-seed. The great bulk of the British import of this article is derived from British India, the Argentine Republic, and Russia. The useful property of drying on exposure to the air, a property already referred to as rendering this oil the most important of those employed in mixing colours for painting, as well as in making varnishes, adapts it for many other uses, which help to give it a very important place in the arts. When treated with sulphur it forms what is called linoleum, which is a soft substance capable of being used for many of the purposes of india-rubber or gutta-percha. Dissolved and mixed with colouring-matter, it is then employed to cover various textile fabrics with a waterproof varnish, thus forming the so-called wax-cloth; but it is probably now most extensively used in the making of linoleum floorcloth, which consists of ground cork and linoleum mixed together and pressed upon canvas.

329. Rape-seed is the seed of two or three species of the cabbage genus (*Brassica*) extensively grown in Europe as well as India. The oil made from it was formerly the chief lighting agent in North and Central Europe; and colza-oil, which is that derived from *Brassica rapa*, var. *oleifera*, DC., is still of great value for use in lamps. It is now more largely used as a lubricant, and even for this purpose is likely to be displaced in course of time by paraffin and petroleum.

330. The sesame of commerce is the seed of a herb which was grown for its oil both by the Egyptians and Babylonians of ancient times, as it now is in India and Asia Minor. The oil is called in India til or jinjelly, and is used as a table oil as well as for lighting. The seed is the richest in oil of all the important oil-seeds, yielding oil to the amount of more than half its weight. The beniseed of West Africa is derived from a member of the same genus. Poppy-seed, which yields an oil used for cooking and for mixing colours, as well as in soap-making, is exported chiefly from India, the bulk of the export going to France. From India France also derives some of the ground-nuts, *Arachis hypogæa*, L., the oil obtained from which is now employed in that country for the same purposes as olive-oil; but by far the largest supplies of this commodity are obtained from the tropical parts of West Africa; a portion also from South Africa. The cultivation of this plant is, however, increasing very rapidly in India, and in several of the French tropical colonies, in consequence of the rising demand. The ground-'nuts' are in reality pods which are so called because they bury themselves under ground to ripen. Castor-oil, which is expressed from the seeds of a tropical tree or shrub belonging both to the Old and New World, enters into commerce chiefly in the form of the oil, and only to a small extent in the form of oil-seeds. India is the chief source of supply. The oil is used in soap-making as well as in medicine, and for other purposes. In China it is used as a table oil.

331. Two palm-trees yield large supplies of oil. That which yields the oil generally distinguished as palm-oil is the tree known to botanists as *Elæis guineensis*, Jacq., that is, the Guinea oil-tree—a name by which it is very appropriately designated (333). Like the product of the next tree, palm-oil is largely

used in soap and candle-making, being combined with stearine (358*b*) for the latter purpose. Another important use of this oil is in the tin-plate trade. The iron sheets, before being tinned, are dipped in a hot bath of this oil to prevent oxidation. Coco-nut oil is expressed from the kernels of the coco-nut, and is imported into England chiefly from Ceylon and Madras. The dried kernels of the coco-nut also enter largely into commerce under the name of copra, being exported from all parts of the world where the coco-palm is abundant.

332. Oil-cake is a general name for the masses of crushed seeds that remain after the oil has been pressed out of them, and it is now very largely used in the feeding of cattle, which it fattens very rapidly; frequently also as a manure (245). It is chiefly derived from linseed, rape-seed, and cotton-seed.[1]

333. Of the ethereal, essential, or volatile oils—that is, oils that can be evaporated and recondensed without changing their nature—the most important is the oil or so-called spirit of turpentine, obtained by distillation from the resin of various firs, pines, and other cone-bearing trees. It is very largely used to dissolve resins (334), and in the making of paints and varnishes, as well as for cleaning. Almost all the British import is from the United States.

VEGETABLE WAXES, see Wax (361).

334. **GUMS, RESINS, AND OTHER VEGETABLE EXTRACTS**, exclusive of those used chiefly as Drugs, Narcotics, Tans, or Dyes, and vegetable Waxes. Resin is a general name for a variety of substances, which are all originally fluids in the tissues of plants, but which become solid, which are all more or less clear or translucent, though generally with a tinge of colour, which are all inflammable and insoluble in water, but soluble in alcohol and the essential oils, such as oil of turpentine (333). They generally exude in a fluid state from the stems and branches of trees, but are sometimes found in hollow spaces in the wood, or lying in the ground where the trees yielding them have grown. Gums resemble resins in appearance and origin, but differ in being soluble in water, but insoluble in alcohol and essential oils.

334*a*. The resin which forms by far the most important commercial commodity, so far as quantity is concerned, is that which is entered in the 'Annual Statements' of British trade as rosin. It is used in the making of paper (435), and soap (455), and for many other familiar purposes. It is the substance that remains behind from the distillation of turpentine after the oil of turpentine has been separated, and hence is imported, like the latter commodity, mainly from the United States. From Russia and Sweden, the European countries which have the greatest abundance of cone-bearing trees, comparatively little rosin or oil of turpentine is exported; but, on the other hand, these are the chief sources of supply for wood-tar and pitch, which are obtained from the timber of the same group of trees, by burning it in covered pits in such a manner that no flame is produced. From tar, creasote, an excellent preservative of timber, is made by a complicated process. The export of tar from the United States is comparatively small, though there is a large production of the article for home use. Burgundy pitch, which is used as an external application in medicine, is properly a kind of resin obtained by treating the natural resin of the silver fir (common frankincense, as it is called), and when genuine is principally imported from the continent of Europe; but the substance so called is now largely manufactured from rosin or turpentine.

334*b*. The other resins of commerce are principally used either in the making of varnishes and lacquers, or for burning as incense. The chief of those employed for the former purpose are dammar, the product of a cone-bearing tree (*Dammara orientalis*, Lamb.) which grows in the Eastern Archipelago; kauri gum, the resin of the New Zealand pine, which is another species of Dammara (*D. australis*,

[1] Imported mainly from the United States, Egypt, and Germany.

Lamb.); **copal**, obtained from various tropical trees; and **sandarach**, the product of a cone-bearing tree belonging to Algeria and other parts of north Africa. **Kauri gum** is principally derived not from trees still standing, but is dug in large lumps out of the earth over a large part of the North Island of New Zealand, where forests of this tree formerly existed. It forms the finest of all resins for varnishes. Copal (frequently known as gum copal) is obtained both from the Old World and the New. The best sort is said to be that derived from a tree growing in the west of Africa (Angola and Benguela), but it is also obtained from the east of Africa, India, the Eastern Archipelago, the West Indies and South America. **Mastix**, the product of a species of Pistacia which grows in various parts of the Mediterranean region, but above all on the Island of Chios, is now not so much used in the making of varnishes and lacquers as formerly, but is still largely consumed in the Levant as a material for chewing to cleanse the teeth and strengthen the gums, as well as in other ways. **Dragon's-blood**, a red resin which exudes from several trees belonging to the tropics of the Old and New World, is imported for the colouring of varnishes and for use in making wood-polishes.

335. To the list mentioned in the last paragraph may be added **amber**, which is nothing else than the resin from certain extinct cone-bearing trees. Though chiefly employed in the making of a variety of ornamental articles, amber is also used in making varnishes. It is principally obtained on the Baltic coast of Prussia, between the Frisches Haff and the Kurisches Haff, whence the article, which was very highly valued in antiquity (4), was conveyed by several routes to the civilised countries round the Mediterranean. At the present day amber seems to be most valued for ornamental purposes in China, where it is regularly imported in considerable quantity. The substance is occasionally obtained at various points on the shores of the Mediterranean, and more regularly on the coasts of China and Siam. Some kinds of copal are, however, frequently substituted for the true amber, and sold as such, being hard enough to be applied to the same purposes as the genuine article.

336. Of resins used to burn as **incense**, the most important are olibanum, or the **true frankincense**, the product of various species of trees belonging to the genus Boswellia, natives of Africa, southern Arabia, and India; **myrrh**, the product of species of Balsamodendron belonging to the same regions; and **benzoë**, derived from the bark of a tree called *Styrax Benzoïn*, Dryand., which grows in Indo-China and the Eastern Archipelago. This last substance is largely used not only in the ceremonies of the Roman Catholic Church, but also in the religious services in Eastern Asia; in India and China it is also employed in the making of cosmetics, and by the rich to fumigate their rooms. In Japan it is mixed with tobacco for smoking.

337. The **gum arabic** of commerce is derived from various species of Acacia growing in different parts of the world. The best kind is imported into Europe, most largely from northern Africa, chiefly by way of Egypt and Senegal, and, according to Schweinfurth, is mostly derived from the *Acacia senegalensis*, Ait. (*A. Verek*, Guill. et Perott.), a tree found throughout the Sudan from the west to the east of Africa, and also in the arid portion of India immediately to the north-west of the Deccan Peninsula. The trade in that portion of the gum which is introduced into Europe from the Senegal region is in French hands, and it is imported into other countries mainly from France. The *A. arabica*, Willd., which grows over the whole region occupied by the former species, and also in southern Arabia, supplies a portion of this gum; and so also does the *A. gummifera*, Willd., a native of the countries lying to the north of the desert of Sahara. Large quantities of inferior gum are exported from the African ports on and near the Red Sea, but these reach this country chiefly through Bombay, and hence are entered in the 'Annual Statements' of British Trade as from the British East Indies;

for, notwithstanding the fact that both the Sudanese trees yielding gum grow also in India, and a useful and strong adhesive gum is obtained from the *A. Catechu*, Willd., which is more widespread in India, and is mentioned elsewhere (428) as supplying a tanning and dyeing material, the export trade in native Indian gums still awaits development. Among other sources of supply of this commodity are south Africa, where it is obtained from the *A. horrida*, Willd., and Australia, where it is chiefly derived from the *A. pycnantha*, Benth., which supplies also a powerful tanning bark (427).

The only other important gum of commerce—not counting the so-called gum-lac (362)—is **gum tragacanth**, the product of several species of Astragalus belonging to the countries surrounding the Mediterranean. It is principally exported from Smyrna, in Asia Minor, and is used as a vehicle for applying discharges (chemical agents for removing colour) in calico-printing, as well as for other purposes.

338. SPICES AND CONDIMENTS. The most important spices are all products of the torrid zone. Only three—pepper, ginger, and cinnamon—are entered separately in the 'Annual Statements' of British Trade, and the order in which they have been mentioned indicates their relative importance as British imports. Usually more than three times as much pepper as ginger is imported, and about twenty times as much pepper as cinnamon; and the values of the several articles give a still higher ratio to the excess of the import of pepper over that of the other two. As to the former importance of pepper and other spices in commerce, see 742*b*.

339. Under the name of pepper several different articles are sold in the shops. **Peppercorns** and **black** and **white pepper**, which make up the great bulk of the pepper of commerce, are **all derived from one species**, a twining and climbing plant, *Piper nigrum*, Linn., belonging to southern India, the Eastern or Malay Archipelago, and Indo-China, and largely cultivated in those regions for the sake of its spice, which is the most generally used of all spices, both among rich and poor. The peppercorns are the whole berries, and black and white pepper the same ground, with this difference, that to make white pepper the peppercorns are first deprived of their outer skin by steeping them in water for several days. Ninety per cent. of all the pepper imported into this country comes from the **Straits Settlements**, but the principal part of this import is the **product of Sumatra**, **Borneo**, and **Siam**, collected at Singapore. A considerable quantity, however, is the product of the Straits Settlements themselves, and most of the remainder is derived from the **Malabar coast of India**. Another species of Piper (*P. longum*, Linn.) produces long pepper, which is the dried unripe fruit of that shrub; a native of the same regions as the last, but extending to a more northerly latitude. **Cubebs** are the berries of another species (*P. Cubeba*, Linn.) belonging to the same region, and a fourth species, the betel (*P. Betel*, Linn.), furnishes the leaves which are used along with areca-nut and other ingredients to compose the favourite stimulant chewing-mixture of the people of India. **Cayenne pepper** is the product of a totally different plant, being the ground pods of different species of Capsicum, one of which has smaller pods, used entire in pickling, under the name of **chillies**. Originally natives of South America, they are now grown in tropical countries in the Old as well as the New World, and even in the warmer parts of the temperate zone, as in Spain and Hungary. The United Kingdom is the great market for all kinds of peppers, and re-exports on an average about two-thirds of her whole import.

340. Ginger, a spice known to the ancient Greeks and Romans, and much liked in the middle ages, is the **dried root-stock of a plant** known to botanists as *Zingiber officinale*, Rosc., **a native of south-eastern Asia**, but now largely cultivated also in the West Indies and the British settlements in west Africa. Almost all the British imports of this commodity are from parts of the British Empire—principally the British East and West Indies. The West Indian article has the higher average value.

341. The cinnamon of the shops is the product of two different trees, in both cases the bark (ground or unground) of the smaller twigs. One of these, the dearer and better of the two, is derived from the *Cinnamomum zeylanicum*, Nees., or Ceylon cinnamon, and is distinguished in commerce as the true cinnamon, although it seems probable that the *cassia lignea* of commerce, the product of the *Laurus cassia* of Linnæus, was the cinnamon of the ancients, the so-called true cinnamon not having been discovered till the thirteenth century of the Christian era. The Ceylon cinnamon is very exacting as to soil and climate, and hence is restricted to limited areas. It is the product of this tree alone that is entered as cinnamon in the 'Annual Statements,' and all but a small fraction of the import of this commodity into Great Britain is still derived from Ceylon, though the tree is also grown on the islands of the Eastern Archipelago, and has been introduced into the West Indies and South America. The *Laurus cassia* is much more widespread, growing wild (as well as cultivated) in the tropical and sub-tropical parts both of the Old and New World; but the greater part of the cassia lignea of commerce is obtained from China. The total annual produce of cassia in the world is estimated at half as much again as that of cinnamon.

342. Of the unenumerated species of the 'Annual Statements' two of the most important are cloves and nutmegs (including mace), both produced chiefly on the Moluccas or Spice Islands, but imported into this country mainly by way of Singapore. Cloves are the flower-buds of *Caryophyllus aromaticus*, Linn., dried before opening; nutmegs are the kernel of the fruit of another tree, *Myristica moschata*, Willd., and mace the investment of that kernel. Both trees are natives of the Moluccas, to which the Dutch for a long period confined them,[1] retaining for themselves the monopoly of the trade in these spices. Both trees have now, however, been introduced into other parts of the world; both of them into the Straits Settlements and British India; and the clove-tree into many parts of the torrid zone, both in the Old World (Zanzibar &c.) and the New.

342*a*. The greater quantity of the remaining unenumerated spices are derived from the British West Indies, and among those having this origin the most important is pimento, or all-spice, the unripe dried berries of the *Pimenta officinalis*, Lindl., which is cultivated chiefly on the island of Jamaica. Among the minor spices in European trade may be mentioned cardamoms, which are, however, the most valuable of all Indian condiments. They are grown to such an extent on the mountains of southern India, that the name of Cardamom Hills is given to the range forming the background of the native state of Travancore. Vanilla is the pod of a twining orchid originally belonging to Mexico and South America, but long since successfully introduced into the tropics of the Old World, including the Islands of Bourbon and Mauritius, which now rival Mexico in the production of this commodity. Cummin, the seed of a plant native to the upper Nile regions, but introduced at an early age into southern and eastern Asia, was an important spice in ancient times and in the middle ages, but now plays little, if any, part in European commerce. Star-anise, the seeds of a tree (*Illicium verum*, Hook. f.[2]) belonging to southern China, is imported into Europe in considerable quantity as a flavouring for spirits. The chief spices and condiments grown in European countries are fennel, caraways, coriander, aniseed, and mustard.

343. DYE-STUFFS FROM THE VEGETABLE KINGDOM. Some of the most important of these are extracted from the heart-wood of certain trees, and the woods yielding them (chiefly the products of tropical countries) are imported into industrial countries in considerable quantity under the heading dye-woods. In the 'Annual Statements' of British Trade there is only one wood of this class

[1] Cloves to Amboina, nutmegs to Banda. [2] See *Kew Bull.*, No. 18, p. 173.

sufficiently important to be separately enumerated, this being logwood, a wood of a dark-red colour yielding an extract which is largely used in dyeing blue, brown, and black. It is the wood of the *Hæmatoxylon campechianum* of Linnæus, a lofty tree which owes its specific name to the fact that it is very abundant in the district of Campeachy in the Mexican province of Yucatan. It is, however, chiefly imported from the West Indies and British Honduras. The dye-woods not separately enumerated are imported into this country in largest quantity from Central America, which of late years has been furnishing greater and greater supplies of this class of merchandise. One of the principal dye-woods so entered is fustic, a wood yielding a yellow colouring-matter, but chiefly used in combination with other materials to produce differently coloured dyes. It is the product of a tree known to botanists as *Maclura tinctoria*, Don, and is now exported mainly from Nicaragua under the name of mora-wood. Another yellow dye-wood, the product of *Rhus Cotinus*, Linn., a tree of the same genus as those which yield the sumach of commerce (429) and the Japanese wax (361), is imported under the name of fustic from southern Europe, and is sometimes, owing to a misapprehension, distinguished as young fustic. Next in importance to fustic among the dye-woods of Central America is the red Brazil wood, the product of *Cæsalpinia brasiliensis*, Sw., and imported also from Brazil and other parts of South America. A still finer red dye-wood is the camwood of commerce, the product of *Baphia nitida*, Afzel., a native of western Africa. A species of Cæsalpinia (*C. Sappan*, Linn.) belonging to India and the south-east of Asia yields a yellow dye from its wood. Sappan wood is exported to some extent for the sake of this dye, though from India it is chiefly the dye itself that is exported. Besides the so-called young fustic there is one other dye-wood of importance derived from the temperate zone, the quercitron of the United States of America, this being the ground bark of a species of oak (*Quercus tinctoria*, Willd.), used in tanning, as well as in dyeing. It imparts a bright yellow colour.

344. The substances of vegetable origin entered as dye-stuffs in the 'Annual Statements' are either parts of herbs from which dyes may be extracted, or extracts used in dyeing, whether derived from herbs or from the wood of trees. Of such dye-stuffs by far the most important is indigo, the fine blue dye obtained chiefly from a shrub *Indigofera tinctoria*, Linn., a native of the tropical parts of south-eastern Asia, but now largely grown also in the tropics of the New World, as well as in Africa, and even in Trans-Caucasia. The dye is derived from all parts of the plant, which is cut down just as the flowers begin to appear. This dye is mostly imported in cakes from India, where the plant is cultivated chiefly in Bengal and Madras, less extensively in the North-West Provinces and the Punjab. Next to India, our largest supplies are obtained from Central America (especially San Salvador). In India the area under indigo fell from 1,366,500 acres in 1897 to 803,700 acres in 1901, and the amount of exported indigo fell from a maximum of 187,337 cwts. in 1895–96 to 89,750 cwts. in 1901–2. Meanwhile the export price fell from an average of above 19*l.* to below 14*l.* per cwt. This change has been due to the successful production of indigo synthetically. Several processes for doing so were discovered by different chemists, but the earlier of these were not commercially practicable. In 1897, however, an indigo dye, called indigotin, was successfully produced by German dye-works.

345. The other dye-stuffs of vegetable origin separately enumerated in the 'Annual Statements' are madder and safflower, besides cutch, gambier, myrobalans, and sumach, which are also used in tanning (427–429). Madder is entered as madder, madder-root, garancine, and munjeet, garancine being the colouring principle extracted from the madder-plant, and munjeet Indian madder (*Rubia cordifolia*, Linn.). The European madder (*Rubia tinctorum*, Linn.) was formerly grown pretty extensively in various parts of the mainland of Europe, being the

principal source of certain dyes, chiefly red, but also yellow; but the discovery in 1868 of the method of preparing similar dyes much more cheaply from coal-tar products (462) has greatly reduced this industry. There is still, however, a demand for madder dyes, inasmuch as these are more lasting than their coal-tar rivals—a fact which may perhaps again lead to an increased use of the former. **Safflower** (*Carthamus tinctorius*, Linn.), a plant with large yellow flower-heads, from which a red and a yellow dye are obtained, is another dye-plant which has been adversely affected by the invention of the coal-tar dyes, but it is still cultivated for its dye all over India, as well as in a few places in Europe.

346. The only other dye-stuff not of mineral origin separately entered in the British 'Annual Statements' is **cochineal**, a red colouring-matter obtained from the dried bodies of an insect (*Coccus cacti*, Linn.), belonging to the same genus as that which yields the lac of India (362), and the same genus as the kermes insect which lives on the kermes oak in the Mediterranean region, and yields another red dye, the 'scarlet' of the Bible. Cochineal is chiefly imported from the Canary Islands, where the plant on which the insect feeds (*Opuntia coccinillifera*, Linn.) is largely grown for the sake of this product.

347. Of the dye-stuffs not separately enumerated in the British tables, one of the most important is **annatto** or **arnotto**, a reddish-yellow dye chiefly used for silks, and therefore (232) more largely imported into France than any other country. It is derived from the fruit of a tree (*Bixa orellana*, L.) belonging to tropical America, and into France is chiefly imported from Guadeloupe. Two lichens may be mentioned yielding dyes of some importance. One of these, *Lecanora tartarea*, Ach., is obtained to a small extent from the rocks of Scotland and Wales, but more abundantly from Sweden and Norway, and is used as a red dye under the name of **cudbear**. It also is specially suited for silk-dyeing. The other, **archil** or **orseille** (*Roccella tinctoria*, DC.), grows on tropical rocks and trees, and is imported from the Canary Islands and various parts of the tropical regions of Africa and America. It is stated to be one of the products most abundant in the Congo basin. From it two dyes are obtained—a purple-red dye and a blue dye—the latter of which is distinguished as **litmus**, and, among other uses, is employed to colour papers used by chemists as tests for acids, which change such papers from blue to red. Under the name of **yellow berries** the fruits of trees of the buckthorn genus (*Rhamnus infectorius*, Linn. &c.) are imported in considerable quantity from Smyrna for the sake of a yellow dye which they afford. **Gamboge**, the hardened sap of a tree belonging to Indo-China and the Eastern Archipelago, *Garcinia morella*, Desv., and **turmeric**, an extract from the underground stem of *Curcuma longa*, Roxb., a plant belonging to the same regions and also to China and India, are imported as yellow dyes, but are more used in the making of coloured varnishes and for other purposes in the arts than for dyeing fabrics. Turmeric is used, like litmus, to colour test-papers employed in chemistry.

348. The dyes already mentioned include only a very small number of those which can be extracted from members of the vegetable kingdom. In India it is said that over three hundred dyes and tans are known to the natives, and the majority of these are believed to be in regular use. But the use of most vegetable dyes is rapidly giving way before those already referred to as made from products of coal-tar.

349. **TIMBER.**[1] This is one of those bulky commodities which require a vast amount of shipping for their transport. About the end

[1] 'A most valuable practical test of the increased consumption and the growing scarcity of timber is the advance in prices. It has been estimated that in Germany from about 1550 to 1750 wood quadrupled in price, from 1750 to 1830 the progressive increase of price was at the same rate, but from 1830 to 1880 the

of the nineteenth century the import into the United Kingdom amounted to about 6½ million loads, each 50 cubic feet (half a register ton of shipping), in addition to about 200,000 tons of furniture and other hard woods, and manufactures of wood (entered in our tables only by value) to the value of upwards of 1,000,000*l.* The British import of pit-props alone amounted then to nearly two million loads of the value of more than 2,000,000*l.* Timber is, for the most part, exported on a large scale only where there are exceptional facilities for water transport. Most of the timber of commerce is obtained from **firs** and **pines**. It is exported in the form of logs, deals, deal ends (deals less than six feet in length), planks, and boards; sometimes in the form of shooks, that is, sets of staves for barrels. The four European countries which export an excess of timber are Russia, Sweden, Norway, and Austria-Hungary; and the United Kingdom is the country which has the greatest excess of imports. In America, the United States and Canada both export timber and timber products to the value of several millions sterling. The chief Canadian exports under this head to the United Kingdom are in the form of sawn or split, planed or dressed fir. In all of the exporting countries mentioned fir and pine predominate, but **oak** is a very large export from both the American countries named, as well as from central Europe. Elm, beech, walnut, maple, are among the other important timber-trees of the temperate zone, and the spotted wood of the New England sugar-maple (309), known as bird's-eye maple, is highly esteemed for cabinet work.

350. Mahogany is the wood of *Swietenia mahagoni*, L., a large tree belonging to tropical America, including the West Indies. The best quality is obtained from the Island of Hayti; inferior sorts from Cuba, Jamaica, Mexico and British Honduras. When grown on marshy ground, like most of that of British Honduras, the timber is comparatively soft and of poor quality. **Teak**, the only other timber specially mentioned in the 'Annual Statements' of British Trade, is of the highest value for shipbuilding and in construction generally, being as hard and durable as oak, and having at the same time this advantage over oak, that while the latter timber is said to promote rust, teak contains an oil which tends to preserve iron by preventing rust. It is chiefly imported from Burma (748), but is largely grown in other parts of the East Indies, including Java. **Ebony** is a name given to the wood of various trees. The hardest, blackest, and most valuable kind is the product of *Diospyros ebenum*, Koe., a native of India. **Rosewood**

rate was much higher, reaching in some cases 300 per cent. within the half-century. What was worth 100 francs in 1840 was worth 150 francs in 1850, 260 francs in 1860, 360 francs in 1865, and 400 francs by 1877. In the United States prices rose 100 per cent. between 1874 and 1882; and an equal rise took place in Russia; while in Sweden and Norway, between 1847 and 1882 (thirty-five years) a rise of from 150 to 200 per cent., according to species, occurred.'—G. S. Boulger, *Wood*, pp. 127–8.

is another name given to several different kinds of timber, the best being derived from various species of Cæsalpinia; the best of all, it is said, from *Cæsalpinia brasiliensis*, Sw. The term cedar is used with equal laxity, being applied to a number of trees whose wood is thought to resemble that of the true cedar of Lebanon in colour or appearance or both. The cedar of Lebanon furnishes none of the timber of commerce. The **white cedar** is derived from *Juniperus oxycedrus*, L., *Cupressus thyoides*, L., and other trees; the **red cedar** (used in making pencils) from *Juniperus virginiana*, L., and *J. bermudiana*, L. Most of the cedarwood of commerce comes from the West Indies and Central America. Red woods derived from two gigantic species of Eucalyptus —**jarrah**, or *Eucalyptus marginata*, and **karri**, or *E. diversicolor*—are now largely imported from Western Australia for the manufacture of paving blocks, furniture, and other purposes. The wood of the jarrah is also very useful in making piles to be sunk in water, as it has remarkable durability in water both salt and fresh. They both grow in restricted areas in the south-west of the colony.

351. **FURS.** The fur trade has some peculiar features. It is the most valuable of those which depend for the greater part of their supplies upon the hunter, including the seal-fisher. It is a trade that deals in the skins of a great variety of different animals of all sizes and differing greatly in value, and hence its **products are collected in a few great markets** where merchants and manufacturers can supply themselves with the kinds best suited to their own special market or branch of industry. The regions from which the furs are collected are almost exclusively the temperate and cold parts of the world, the finest sorts being all from the colder regions. Most of the furs come, therefore, from the northern hemisphere, where there is the greatest area of land in the latitudes from which they are derived. The furs derived from North America and the adjacent seas are collected, to a large extent, at the **New York** market, but in still greater quantity reach the **London** market, which also receives large supplies from the southern hemisphere as well as from Europe. The furs of Siberia and northern Russia are principally collected at **Nizhnii-Novgorod**; but the greatest fur-market of the world is that of **Leipzig**, which receives supplies not only from the great markets already mentioned in the east and west, but also direct from almost all the minor markets in different parts of the globe. This pre-eminence it owes to its central situation, not only as regards the sources of supply, but also as regards the region in which furs are mostly worn, fur garments being more in demand in central and eastern Europe than in western Europe, where the winters are relatively mild (468). They are also largely worn by the well-to-do classes in China (774c).

352. To enumerate all the animals that contribute a share to the fur trade would be to mention nearly all the land mammals belonging to the colder parts of the earth, as well as a good many of those belonging to

more temperate regions, and several marine mammals. Among **those which supply the greatest number of skins** to the trade are **squirrels, hares, rabbits, musk-rats** (a kind of beaver belonging to North America), **coypus** (a beaver-like animal whose skins are imported, under the name of nutria skins, mainly from the region round the River Plate in South America), **cats**, and **seals**, all of which are, it is estimated, slaughtered for their fur to the number of at least a million annually; but among those which yield the furs **of greatest value** are the **sable** (from Russia and Siberia, and from North America), the **stoat** or **ermine** (from Europe and Asia), the **sea-otter** (from the west coast of North America), the **black or silver fox**, and the true **fur seal**. The coat of the blubber-seal (**358*c***) is of but little value, and the **true fur seal**, which yields the valuable sealskin of commerce, is a species belonging to a group **distinguished** from other seals **by the possession of external ears**. This species is obtained chiefly on the **Pribilov Islands**, two small islands in Bering Sea, where they come annually to breed. Under the regulations of the Government of the United States only 100,000 may be killed there every year. The species is also hunted by Canadian sealers in Bering Sea and the North Pacific.

353. The fur trade of British North America was for a long time the monopoly of a company called the **Hudson's Bay Company**, which was founded in 1670, and had conferred upon it the exclusive right of capturing fur-bearing animals, and buying furs in the entire region draining into Hudson's Bay. A still wider range of territory was brought within their monopoly at a later date, and remained so till 1860, when the company's claims were again reduced to the tract embraced by the original grant. This also was sold in 1869 to the Dominion of Canada, though the company still retained in its possession certain stations and a portion of the land. During the enjoyment of its monopoly enormous profits were made by the company, which purchased by means of beads and cheap trinkets the furs of animals trapped or otherwise captured by native Indians and brought by them to their agents. Now there are several other fur-companies operating in the same region. The Russian fur trade has been from the first to some extent in the hands of the Russian government, a portion of the revenue of the Siberian provinces being paid in the form of sable, squirrel, and other skins. Large numbers of skins are now derived from the **Australasian colonies**, but these are chiefly **rabbit-skins** of little value (83*b*). The skins of **kangaroos** and other marsupials, however, supply a somewhat more valuable commodity to the fur trade.

354. LIVING ANIMALS AND MISCELLANEOUS PRODUCTS chiefly of Animal Origin. The only living animals which form important articles of commerce are the larger domestic animals. Into the United Kingdom **oxen and bulls** are imported in largest number from the United States, **cows** mostly from Denmark, and **calves** from Holland; **sheep and lambs** are chiefly brought from Germany, Holland, and Denmark; **swine** mainly from Holland, and **horses** from Denmark and Germany. The imports from Holland may probably be to a large extent of German origin.

355. Meat derived from animals is imported in large quantities into the United Kingdom both salted and fresh. **Beef,** whether fresh or salted, is derived mainly from the United States and British North America, but by means of iced chambers it can be brought even from the Australasian colonies. In the case of **mutton New Zealand** and the **Argentine Republic** are now, in consequence of the perfecting of the preserving processes, the chief sources of supply.[1] **Pork, bacon, hams, and lard** are derived mainly from **North America**, including the United States (892) and the British colonies. **Poultry and game,** on the other hand, are derived mainly from the adjacent parts of the **European Continent**; but it is noticeable that Holland, though it supplies us with considerable quantities of poultry, furnishes us with only a small quantity of **eggs. France, Austria-Hungary, Italy,** and **Russia** are, in fact, the only European countries of importance which show a large excess of exports over imports in the case of this commodity; whereas the United Kingdom, Germany, and Holland have an import many times as large as their export. The United Kingdom, indeed, while exporting eggs to only an insignificant extent, imports this article to a much greater amount than the aggregate import of all the other countries mentioned, and that notwithstanding the fact that Great Britain derives immense quantities of eggs from Ireland. The trade in eggs is one that has been greatly expanded and steadied by means of cold storage. The majority of eggs imported are, of course, those of domestic fowls, but the gathering of **eggs** from coasts and islands frequented by **sea-birds**, principally in northern seas, is an important source of livelihood in many places. It is so on the Shetland and Faroe Islands, on many parts of the Norwegian coast, on the islands of Texel and Sylt, in Holland. Here it may be mentioned that it is not merely for food that **eggs** are imported. They **have various important uses in the arts.** The white of egg (**egg-albumen**) is employed in book-binding and the finishing of fancy leathers; as a clarifying agent in sugar-refining and in the preparation of wines; in the making of one kind of photographic paper, and for other purposes. Egg-albumen is largely manufactured in Russia. The **yolk of egg** is employed in making the finer kinds of tawed leather (481). **Butter,** like eggs, is imported into the United Kingdom chiefly from adjacent countries—Denmark (supplying more than 40 per cent. of the total), France, and Holland; but cold storage has in recent years enabled us to receive enormous supplies from across the Atlantic, from Russia and remote parts of Siberia (702*a*), and even from the antipodes.[2] Holland supplies most of the imported butterine, or **margarine,** as it is now called[3]—that is, a preparation made from suet and other animal fats with the addition of a little milk. **Cheese,** which suffers no injury from a long voyage, is supplied to us mainly by the Dominion of Canada.[4] Of the import of this article from the European mainland, by far the greater part comes from Holland; but large quantities of the finest kinds of foreign cheese are originally made in France, Switzerland, or Italy.

356. Of animal products not used as food, the only ones of sufficient importance as mercantile commodities to be entered in the trade returns of the United Kingdom are bones, ivory, horns and hoofs, hair and bristles, feathers, sponges, tallow, isinglass, whalebone, and animal oils and wax, along with which it is convenient to treat of honey. **Bones** are employed in making a great variety of useful

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[1] This trade has attained gigantic developments since the early eighties of last century. See Introduction to the Fourth Edition, par. 10.

[2] More than 10 per cent. of our total import now comes from Australia and New Zealand.

[3] The value of the margarine, avowed as such, imported into the United Kingdom in 1887 approached 4,000,000*l*., equal to more than half the entire value of the imports into England in the early part of the eighteenth century!

[4] In 1902 nearly 70 per cent. of the total import came from Canada.

and fancy articles, and **bone-ash** is a common ingredient in the compositions used in the manufacture of pottery (445). Being in a great measure composed of phosphate of lime, bones are likewise largely employed in the making of manures (423·11). For manufacturing purposes they are chiefly imported from Brazil, the United States, and France; and for use as manure, chiefly from the East Indies and the Argentine Republic.

357. Ivory is the dentine or tooth-substance forming the tusks of elephants, hippopotamuses, walruses, narwhals, and other animals. **Elephant ivory** is distinguished by its lozenge-shaped curvilinear markings. **Hippopotamus ivory** is denser and harder than that of the elephant, and of a superior and more enduring whiteness, but the solid pieces of this kind of ivory are all small, so that it can be used only in making small articles—at most in making the handles of surgical instruments, for which it is highly prized. **Walrus ivory** is inferior to that of the hippopotamus, and that of the narwhal is coarse and of little value. The total annual consumption of ivory in Europe, the United States, British India, China, and Japan is estimated by Scherzer at about 1,100[1] tons, of the value of about 1,100,000*l.* The largest share in the trade belongs to the United Kingdom, which imports about 500 tons annually. Of the total of 1,100 tons, about 1,000 tons are estimated to be derived from the elephant, three-fourths of this quantity being obtained from Africa, the remainder chiefly from the East Indies, though a small supply is regularly obtained from the remains of the Siberian mammoth, which have furnished ivory to China for seven centuries. Under the name of **vegetable ivory** a substance is imported into Great Britain to an amount two or three times as great as ivory proper; but this substance is not one-fifteenth of the value of true ivory, and is used for making buttons and toys. It is mainly the hard albumen of the seeds of a palm, *Phytelephas macrocarpa*, Ruiz & Pav., and the chief country of origin is Colombia.

358. Horns and Hoofs, which are principally employed in the making of combs, buttons, knife-handles, &c., are most largely imported from the British East Indies. (Comp. par. 425.) **Horse-hair**, which is used in upholstery both as a stuffing and in the making of haircloth for the covering of furniture, is imported chiefly from Russia, Siberia (by way of China), and the Argentine Republic; **cow-hair**, now used principally in the making of felt for roofing and for clothing boilers and pipes of steam-engines, is brought into this country mainly from the European mainland. **Pig's-bristles**, the material chiefly used in the making of ordinary brushes, are supplied from abroad, chiefly by Germany, Russia, and China. Even the trade in **human hair** is not inconsiderable, though it does not appear in the 'Annual Statements' of British Trade. France, Italy, and Germany are the countries that furnish the market with most of this article, and **Marseilles** is the chief centre of the trade. The annual value of the French import of human hair, which is not used merely by the hairdresser, but also in the making of bracelets, watch-chains, &c., approaches, if it does not exceed, 100,000*l.* **Feathers** are classed under two heads—feathers for beds, and ornamental feathers. The former are imported into Britain from various countries, near and far, and include the soft down derived from the eider-duck, which is obtained chiefly from Iceland, but likewise from many northern cliffs haunted by sea-birds. Ornamental feathers are imported chiefly from France (the country which, next to Britain, has the largest trade in this article), Holland (which no doubt derives them originally from her possessions in the East), the British possessions in south Africa (where the ostrich has been domesticated for more than a hundred years), and the British East Indies.

358*a*. Sponges consist of a horny internal skeleton of marine animals whose

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[1] In later years much less. See *For. Off. Report*, Miscel. Series, No. 432, pp. 64–68.

living portion consists of a coating of slime, which has to be removed before the sponge becomes an article of commerce. The animals yielding the best sponges live at a depth of only fifteen to twenty feet, and hence, when not covered by sea-weeds, can easily be seen from the surface.[1] **The best sponges are all obtained from the eastern half of the Mediterranean Sea**, from the Gulf of Cabes in the east of Tunis to the coast of Syria. In this area is also included the Dalmatian coast of the Adriatic as a sponge-yielding region. The fisheries are carried on mainly by Greeks, Sicilians, Arabs, and Dalmatians, and it is the first-mentioned among whom the industry is best organised and by whom the longest voyages are made in search of sponges. The headquarters of the Greeks are on the little island of Kalimno, which is situated in lat. 37° off the coast of Asia Minor, to which it politically belongs. Outside of the Mediterranean, the only important source of sponges is the shores of the **Bahamas**, and the sponges obtained thence are all of the poorest quality.

358*b*. Tallow and stearine, which latter is the harder ingredient in tallow, are most largely imported from the United States, the Australian colonies, and the cattle-rearing countries of South America. The former is used principally in the manufacture of soap (**455**), the latter in the making of candles. **Whalebone**, which is taken from the mouth of the Greenland and one or two other whales, and is a horny but flexible substance, now principally used as a stiffener for certain parts of women's dress, and even for this purpose much less than formerly, is imported indirectly from various countries (see **358*c***). **Isinglass**, which is the finest form of gelatine, and is largely used in confectionery and in the arts, as well as for clarifying wine and beer, is obtained from the sound or swim-bladder of various kinds of fish, and is imported into this country chiefly from the British East Indies, Brazil, and China. In Russia it is largely made from the sound of the sturgeon, and in the United States from other species of sturgeon which abound in many American rivers; but neither of these countries supplies much of this commodity to the United Kingdom. The thicker and less refined kinds of gelatine, including glue and **size**, do not enter largely into foreign commerce, but are made in large quantity from native and imported hides and bones by boiling. Even leather which is not made by tanning can be used in the manufacture of glue, but not tanned leather, for the chemical action of the tannin or tannic acid destroys the gelatine.

358*c*. The most important of the **animal oils** of commerce are the produce of the whale- and seal-fisheries, included in British trade reports under the general designation of fish-oil, although neither seals nor whales are, properly speaking, fish. Of this oil there are two kinds. One, called **train oil**, is derived from the blubber or coat of fat which invests these animals under the skin. This kind is obtained principally from the **right** or **Greenland whale**, which is hunted in the seas off the west coast of Greenland, on the northern coasts of Norway, and in the Arctic Ocean generally to the north of Norway and Iceland, and from the blubber **seals**, which are captured by the northern whale-fishers in many places, but most abundantly off the coast of Labrador and in the Gulf of St. Lawrence. Norway and British North America are hence the countries which supply most of the train oil imported into the United Kingdom, notwithstanding the fact that considerable whaling and sealing fleets are annually fitted out from **Dundee and Peterhead.** New Bedford, Massachusetts, was once the head-quarters of important whale-fisheries on the west side of the Atlantic, but since the opening up of the Pennsylvanian oil-field (**406*a***) this industry has died out in the United States. The other

[1] The sponges are generally obtained by divers, but a submarine vessel from which the fishers can seize the sponges by means of specially constructed tongs and deposit them in a basket on the bowsprit has been devised. An electric light with reflectors enables them to see the sponges through a glazed spy-hole.

kind of fish oil is that derived from the cachalot, or sperm whale, which contains immense quantities of oil in a cavity in its enormous head and in a tube which runs along its back. The sperm-whale being found in almost all parts of the ocean, this kind of oil is imported from many parts of the world, most abundantly from the United States and New Zealand (the latter the centre of the southern whale-fisheries), but also from Portugal, the Azores, Peru, and elsewhere. Train oil is used principally in soap-boiling (455), but sperm oil, a finer and more valuable kind, yields in cold weather a kind of waxy body called spermaceti, which, mixed with a little beeswax, is used in the making of candles (par. 408), and by itself in the making of cold cream, salves, &c. A finer kind of train oil than that derived from the right whale is now obtained in greater and greater quantity from the bottle-nose whale (*Hyperoodon rostratus*), the hunting of which has begun to be pursued pretty actively from the north-east of Iceland as a centre. Neither the cachalot nor the bottle-nose whale furnishes whalebone, but the former yields besides oil another valuable product, namely the substance called ambergris, which is largely used in perfumery, and is sometimes found in the body of the animal, sometimes floating on the surface of the water. It is a result of disease. Of true fish oils, the most important is cod-liver oil, which is largely made in Great Britain, as well as in Newfoundland and Norway, from the products of the great cod-fisheries of these countries. A true fish oil is likewise made from the menhaden, a species of Alosa, which is caught in immense quantities off the eastern coast of the United States, from Connecticut to Virginia, above all in the neighbourhood of New York. The oil is chiefly used in leather-dressing, but also in rope-making and painting. Other animal oils are derived from tallow, lard, bone-fat, &c., and are imported into this country mainly from the United States. From the dugong (359, 425) a kind of oil capable of being used for the same purpose as cod-liver oil, as well as in cooking, is largely extracted in Queensland.

359. The following are among the animal products which, though of considerable commercial value, either do not enter into the foreign commerce of the British Isles at all, or not to a sufficient amount to be separately enumerated in the trade returns. **Coral** is the name given to the skeleton of a whole group of marine animals; but the red or pink coral, the skeleton of *Corallium rubrum*, is the only one of great value in commerce, its value being due to its use in the making of trinkets and other ornaments. The coral industry is specially an Italian one, and its chief seat is Torre del Greco, at the base of Mount Vesuvius, in the Bay of Naples. Formerly the chief supplies of coral were obtained by diving in the Bay of Naples, as many as five hundred boats having often set out from Torre del Greco to carry on this fishery. The coral banks both in this bay and in the south of Sardinia, which are also within easy reach of the Torre del Greco fishermen, are being rapidly exhausted, and the fishermen are hence deserting them for those on the coasts of Algeria, Tunis, and Tripoli, which are now more profitable. Coral is also obtained on the coast of Catalonia, round the Cape Verde Islands, in the Adriatic, especially on the east coast, and in other places. Besides the product of its own fisheries Italy imports large quantities of unworked coral, and exports not only coral ornaments, but also the raw material in a partially worked condition. A considerable quantity of coral is exported directly or indirectly to China, where it is used in the official dress of the mandarins. **Pearls and mother-of-pearl** are derived from various shells, especially of the oyster family, belonging principally to tropical seas. The mother-of-pearl is the internal part of the shell, and pearls are secretions of the same kind of matter round some small parasite or particle of inanimate foreign matter which acts as an irritant. Among the most noted pearl-fishery banks are those in the Persian Gulf, in the Gulf of Manar (Ceylon), in the Sulu Archipelago, in the neighbourhood of the Moluccas and the Aru Islands, in Torres Strait, and on the north-west coast of Australia, at Tahiti, and in the Gulf of California.

Pearls are also obtained from various river-shells, especially the *Unio margaritifera*, which is met with in many European rivers, including some of those of Scotland and the north of Ireland. **Charqui, or jerked beef**—that is, beef cut into strips, salted, and dried in the sun—is much used as food in the southern states of South America, where it is an article of trade of no little value. In Norway a new kind of 'corned beef' is now made from the flesh of the whale both for home consumption and for export. **Dugong bacon** is among the preserved meats which are exported from Queensland. **Parchment**, the skin of sheep, and **vellum**, that of calf, prepared for writing on, no longer have the value that belonged to them before the invention of paper, but are still manufactured for use in formal documents and in book-binding. The so-called **catgut** consists of the dried and twisted intestines of sheep and other animals. It is used in making the strings of musical instruments, racket-cords, and cords used by clock-makers, polishers, &c. The intestines of larger animals serve to make **gold-beater's skin**. **Fresh milk** is, of course, only an article of local trade; but **condensed milk**, made by adding sugar, or some other ingredients with or without sugar, to the milk, and then evaporating the milk to a greater or less extent, is exported from Switzerland to the amount of twelve thousand tons or upwards annually. It is also an export of the United States. Milk-sugar, or sugar made from whey, is also exported from Switzerland. **Ghee**, or buffalo butter clarified by boiling, is an article of commerce in India and neighbouring countries. **Koumiss**, the fermented milk of mares, is a favourite drink among certain nomadic tribes in central Asia, and is now largely made in Russia also, on account of its being esteemed a remedy for consumption. An imitation koumiss is now made for the same use in other countries from asses' and cows' milk. The **nests** of a certain kind of swift (*Collocalia esculenta*), which breeds in caves at various places in the Eastern Archipelago, are looked upon as a luxury in China, where they are imported in millions annually. The nature of the nest has long been a subject of dispute, but the best observers seem to be still agreed that those nests at least which are most valued as food (which are always white) are entirely made from a peculiar saliva secreted by the bird, as was asserted more than a hundred years ago.

360. The **wax** of commerce is both of animal and vegetable origin. The greater part of it is still, no doubt, bees' wax, though the commercial supplies of other kinds of wax are increasing. **Bees' wax** is a product of almost all parts of the world. In Europe, **Germany, France,** and **Austria-Hungary** are the countries in which bee-keeping is most general, and the first two those in which it is most highly developed; but so large is the consumption both of honey and wax in Germany and France, that the import of both these commodities is considerably greater than the export. Austria-Hungary exports of both commodities more than it imports, but the whole trade in that country is much less than in the other two. **Italy**, which consumes so much wax in connection with the ceremonies of the Roman Catholic Church, imports from six to ten times as much wax as she exports, but has an excess of exports in the case of honey. Altogether Europe produces much less honey, as well as wax, than is consumed there. The deficiency in **honey**, and part of that in wax, is made up chiefly by the produce of American bees, this being another case in which Europe is indebted to America for surplus supplies of products originally introduced from Europe, for the honey-bee was not known in the New World before it was introduced by the Spaniards into Mexico. Now there is no part of the world in which bee-keeping is carried on on so large a scale as in some parts of **Canada and California**, but the demand for honey and wax in the United States and the Dominion of Canada is so great that the chief European imports of these commodities are sometimes obtained from other parts of America.

361. The **European supplies of wax** are brought from more various sources than those of honey. Bees' wax is imported into this country more largely from

Germany and the United States than any other countries, but there is also a large import of Japanese and Brazilian waxes, which are mainly, if not wholly, of vegetable origin. The Japanese wax is derived from the seeds of a species of Rhus (*R. succedanea*, Linn.), a tree which also grows in China and India the Brazilian is found chiefly in the form of a glutinous powder on the leaves of a kind of palm known as the carnauba, or wax palm (*Copernicia cerifera*, Mart.). This last kind of wax is too hard and has too high a melting point to be used by itself in making candles; and another vegetable substance, known as myrtle wax, the product of a North American shrub (*Myrica cerifera*, Linn.), is too soft and has too low a melting-point to be so used; but both are employed to mix with other candle-making materials, and the former is used in making varnishes. The lofty wax-palm of the Andes (*Ceroxylon andicola*, Humb. & Bónfil) has the wax as a coating on the trunk, and various other trees (in Brazil and elsewhere) yield a kind of wax which is locally used for candle-making and other purposes, but is of little importance in commerce; and others again, such as the *Stillingia sebifera*, Willd., a Chinese tree introduced into both the East and West Indies, yield a kind of vegetable tallow which is mixed with wax in candle-making. Of more importance than any of these last-mentioned substances is the so-called insect white wax of China, which is one of the most important of all articles of trade within that empire, though its high price does not admit of its being exported in any great quantity. This wax is produced in the south-west of the country, and is formed as a coating on the twigs of one kind of tree, through the action of an insect which is bred upon another kind of tree in a different part of the province, and transferred by carriers to the wax-tree when the insect is at the stage for commencing operations on the latter. The wax is excellent for candle-making.

362. The lac of commerce (often called gum-lac), which is the principal ingredient in sealing-wax, is, like the last-mentioned substance, the result of the action of an insect (*Coccus lacca*, Linn.) on the branches of a tree (in India, the principal source of supply of this commodity, generally the *Butea frondosa*, Roxb., or the *Ficus religiosa*, Linn.). The lac is a kind of resin derived from the sap of the trees to which the insect attaches itself, but modified in its properties by passing through the body of the insect itself. It appears in commerce in various forms and under various names. The twigs encrusted with the substance form the stick-lac of commerce. The substance is then freed from the wood and repeatedly washed, after which it appears in the form of grains, forming the seed-lac of commerce; and this, being melted, is re-consolidated into thin flakes, which are known in commerce as shell-lac. Sometimes it appears in another form, and especially in the case of the coarser qualities used for home consumption. The seed-lac after being melted is allowed to drop into rounded pieces an inch or more in diameter, forming what is called button-lac. In the course of the washings above referred to, a red substance originally formed in the body of the insect is separated from the insect, and this, being made into cakes and dried, forms lake-lac or lac-dye.

II. Fisheries

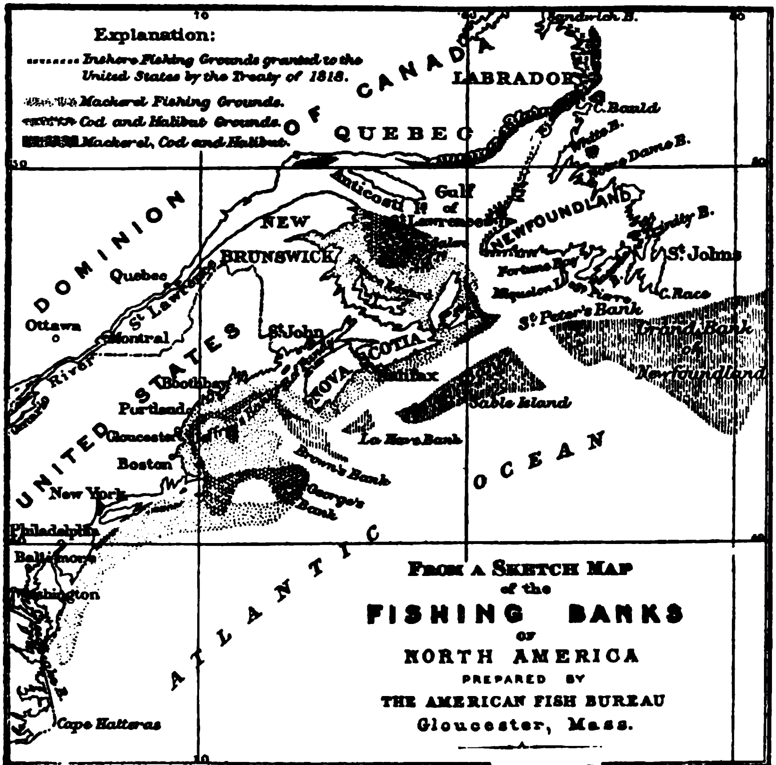
363. Under the head of fisheries we include the commercial production not only of all kinds of fish but also of other marine animals used as food. In this sense the fisheries of the United States and the United Kingdom appear to be the most valuable in the world, the value of the products of the fisheries in each of these countries about 1900 having been above 9,000,000*l*. In the United States, however,

the value of the oysters was not far short of one-fourth of the total, while in the United Kingdom the corresponding value was comparatively small. The annual value of the fisheries of **Canada** increased from less than 8,000,000*l.* in 1880 to upwards of 4,000,000*l.* in 1900; and **Newfoundland** (including Labrador) adds upwards of 1,000,000*l.* annually to the value of the fisheries of British North America. In Europe the fisheries next in importance to those of the **United Kingdom** are those of **Russia, France,** and **Norway.** The value of the French fisheries exceeds 5,000,000*l.*, that of the Norwegian 1,000,000*l.* annually; but in the case of France this includes the produce of the French fisheries on the coasts of Newfoundland and Iceland. In Asia, the most valuable fisheries, so far as statistical data enable us to say, appear to be those of Japan, the produce of which is estimated to exceed in value that of any European country except the United Kingdom.

Seeing that the fishing industry of the United States as well as that of British North America is pursued mainly in the **Western Atlantic**, it is obvious that the **fishing-grounds** of that region must be much the most valuable in the world. These grounds are shown in the sketch-map on the opposite page. They consist of a chain of submerged ocean plateaux elevated considerably above the bottom of the surrounding sea, and they very quickly attracted the attention of the early explorers who visited America. This was in the beginning of the sixteenth century, when all Europe was still Roman Catholic and enormous quantities of fish were consumed in the many Church fasts. The discovery of these rich fishing-grounds hence 'created the most profound sensation, and kings, noblemen, and wealthy merchants engaged in and fostered the enterprise of fishing with a zeal that we may now find difficult to realise or appreciate.' The French fishermen were the pioneers in the cod-fisheries, and it is said to be fairly certain that as early as 1504 the Normans and Biscayans knew of the Newfoundland fisheries. At the present day the coast-line bordering the seas in which these fishing-grounds lie belong to Newfoundland (including Labrador), the Canadian Dominion (provinces of Nova Scotia, New Brunswick, Prince Edward Island, and Quebec), the United States, and the two small French islands of St. Pierre and Miquelon. The fisheries on the banks in the open sea are free to all, but the **rights of 'inshore' fishing are limited by treaty.** The treaty at present regulating the rights of United States fishermen in British waters and those of Canadian and Newfoundland fishermen in United States waters is the Treaty of London of 1818, according to which the waters within three miles of the coast are reserved for the fishermen of the country to which the coast belongs, except along the coasts indicated by crosses on the accompanying sketch-map. French fishermen are allowed to fish on all the coasts of Newfoundland from Cape St. John (lat. 50° N. on the east coast) round the northern peninsula of the island, and as far as Cape Ray, at the southern end of the west coast.

They are allowed to dry fish on the land, but not to form any permanent settlements on the island.

364. Nearly half the value of the fishery products of the **United States**, exclusive of oysters, is furnished by the **New England** States, and among these, chiefly by **Massachusetts and Maine.** The principal fish caught are **cod, mackerel, hake,** and **herring.** Two species of Alosa are likewise caught in large. numbers. One of these is the



F. S. Weller, lith.

menhaden (358*c*); the other is known as the **alewife,** and is caught most abundantly in the waters of North Carolina. It somewhat resembles the shad, and is used as food.

On the **Pacific coast** the great speciality of the fishing industry is the catching of **salmon** for export in tins (**salmon-canning**). It is chiefly pursued on the Columbia River (Oregon), the Sacramento (California), on the Fraser, Skeena, and Naas Rivers, besides several inlets in British Columbia, and in recent years above all in the rivers and creeks of Alaska. Next to the salmon fisheries those of cod and

halibut are the most important on this coast, exclusive of the **seal-fisheries** (352).

The chief products of the **lake fisheries** are **whitefish, trout, 'herring,'** and **sturgeon**; the whitefish and herring being both species of Coregonus. Of these the whitefish are the most valuable, not only as regards the amount caught, but also relatively to quantity. Throughout the United States and Canada they are esteemed a peculiar delicacy, and large quantities are transmitted fresh to distant markets in refrigerating trucks. The **oyster-fisheries** of the United States are of very great value. They are chiefly carried on in **Chesapeake Bay**, Maryland and Virginia being the states most largely concerned in the industry, and Baltimore the centre of the trade. (See 127.)

365. The **Canadian fisheries** yield chiefly **cod, lobsters, herring, and mackerel**, besides salmon, these last being mainly produced in British Columbia. **Nova Scotia** and **New Brunswick** are the leading provinces in this industry, the former producing annually nearly one-half of the total value, the latter one-fifth or more. In **Newfoundland** the production of cod is far in excess of that of any other fish.

366. The **fisheries of the United Kingdom** are pursued **chiefly in Great Britain.** Not only is the value of the fish caught in Irish waters relatively small, but a large proportion of the catch is made by English, Scotch, and foreign fishermen. The principal reasons for this state of things are these. The waters of the North Sea are much richer in food-fishes than the other waters of the British Isles; the principal Irish fishing banks are off stormy parts of an iron-bound coast in the north-west and south-west, in some cases far out at sea; the Irish fishermen are mainly peasants, who make use of small boats fitted only to take advantage of brief spells of fair weather; the chief markets for fresh fish are in Great Britain, and accordingly not accessible by railway[1]; the Irish railways do not extend to certain places where fish might otherwise be advantageously landed; and, finally, there are in Ireland no proper fish-curing establishments.

366*a*. The **English fisheries** are more miscellaneous than those of Scotch waters, **herrings, soles, haddocks, cod, turbot, and mackerel** all having a high place in the list of products of the fisheries of England, whereas in those of **Scotland the herring-fisheries are without a rival**, those of haddock and cod coming next. **Oysters** are largely produced at **Whitstable** on the north coast of Kent, on the Essex coast, and on the coast of the Isle of Wight. **Pilchards** are a speciality of the **Cornish coasts**. The chief ports at which fish are landed in England are (in the order of importance) **London, Grimsby, Hull, Lowestoft,** and **Yarmouth**. The principal seats of the herring-fishery in Scotland are **Wick, Lerwick, Fraserburgh,** and **Peterhead. Aberdeen** is the greatest trawling centre north of the Humber.

[1] Special fast trains are essential to the carriage of this very perishable commodity. Successful experiments have been made in the carriage of live fish by rail from Tréport (near Dieppe) to Paris.

367. The principal **Norwegian fisheries** are those of cod and herring, the cod-fisheries being carried on chiefly on shallow banks round the **Lofoden Isles (647)**, the herring-fisheries mainly in the neighbourhood of **Bergen.**

368. In the **fisheries of France, sardines** and **anchovies,** and also **oysters,** are of special importance. The **sardine and anchovy** fisheries are carried on mainly on the Mediterranean coasts, the sardines of Provence being esteemed the best. The great market for the Provence fisheries is Beaucaire on the Rhone, east of Nîmes. On the Atlantic side the great seats of sardine-packing are Bordeaux and Le Mans. Sardines and anchovies are likewise caught and prepared for export on the coasts of Spain, Portugal, and Italy; but it must be mentioned that a kind of sprat is often prepared like the sardine and sold under that name. **Oysters** are produced mainly on the coasts of Brittany, and other parts of the Atlantic coast farther south. Since about 1856 **artificial oyster-breeding** has been pursued in France with great success, chiefly in the basin of **Arcachon** (to the south of the Gironde), and in the bay of **Morbihan** (on the south coast of Brittany).

369. Beside the sardine and anchovy the only important food-fish of the Mediterranean waters is the **tunny.** This fish (*Scomber thynnus*) is a gigantic congener of the mackerel (*Scomber scomber*). It attains a length of as much as twelve or thirteen feet, and a weight of 1,000 to 1,200 lbs., and it appears in immense shoals in the beginning of summer, especially on the coasts of Sicily, Sardinia, and southern France. The fishery is carried on chiefly on the coasts of Sicily and Sardinia, which are visited by thousands of native and foreign fishermen during the fishing-season.

370. In Russia the river fisheries and those of the Caspian Sea are of great value in consequence of the abundance of the **sturgeon** in these waters. **Caviare,** or the roe of the sturgeon prepared as a condiment, is by far the most important fishery product exported from that country, the annual value of the export now exceeding 300,000*l.*

371. Of the fisheries in Asiatic and Australian waters the only ones that need be mentioned are the fisheries of Japan, and those of trepang in tropical seas. The waters surrounding the island of **Yezo in the north of Japan** abound in salmon, cod, herring, and other food-fishes, the catching of which forms the principal industry of the inhabitants. **Trepang,** also known in commerce by the French name of *bêche de mer,* is a kind of sea-cucumber, which is a favourite article of food with the Chinese, and is extensively fished for the Chinese market on all the coasts of the Eastern Archipelago, on those of New Guinea and northern Australia, and round many of the tropical islands of the Pacific. It is likewise exported from China to distant countries in which Chinese are settled (California &c.).

372. The **foreign commerce in fish** is by no means proportioned to the productiveness of the fisheries, most kinds of fish being produced

mainly for markets near at hand. The fish exports of the British Isles (chiefly herrings to the Baltic) are about balanced by the imports, so that the value of the production of fish on the British coasts is almost equivalent to the home consumption. The value of the export from the United States is equal to perhaps one-seventh of the total production, by far the largest item being **canned salmon**, which is sent chiefly to the United Kingdom and Australasia. Dried and **cured cod** and other fish come next in importance, these being sent mainly to the West Indies, South America, and Germany. About one-third of the produce of the Canadian fisheries is exported chiefly to the United States. **Newfoundland and Norway are the two countries which export the greater part of the produce of their fisheries.** From Norway are exported both herrings and dried and cured codfish. The herrings are sent chiefly to the Baltic, but the **great markets** for the latter are the same as those for the dried and cured codfish which make up the bulk of the export from Newfoundland, namely **Spain, Portugal,** and **Italy,** Roman Catholic countries in which there is still a very large consumption of fish. St. John's in Newfoundland and Bergen in Norway are the centres of this trade. Bergen has the advantage over St. John's of being about 860 nautical miles nearer the Straits of Gibraltar; but, on the other hand, it is at a greater distance from the chief fishing-ground. A small quantity of dried codfish is also exported from Nova Scotia to the same markets, but Halifax in Nova Scotia is under the disadvantage, in respect of this trade, of being about 500 nautical miles further than St. John's from the seaports of southern Europe.

372*a*. **Germany**, with a small fishing industry relatively to its length of coast-line and consumption of fish, has a large import trade in this commodity. The annual value of the net **imports** amounts to about two millions sterling, nearly three-fifths of that amount representing **herrings.**

III. Mineral Products

373. COAL. Coal consists of vegetable matter which has been buried and sealed up out of contact with the air in past ages, and has then undergone a series of slow chemical changes, the general result of which is to get rid of a large proportion of hydrogen and oxygen, and to increase the relative proportion of carbon in the remaining substance. In pure woody fibre the proportion of carbon present is little more than half, whereas in ordinary **bituminous coal** it may amount to from 85 to upwards of 88 per cent. The substance known as **lignite**, or brown coal, consists of vegetable matter much less altered than in ordinary coal, and contains a smaller relative amount of carbon, say 70 per cent. In certain situations, again, the process of removing hydrogen and oxygen has gone further than in the forma-

tion of bituminous coal, and as much as 94 per cent. of carbon may be present. There is then formed a kind of coal called **anthracite**, which is lustrous on the surface, does not soil the fingers, is difficult to light, burns with little or no flame, but produces an intense heat when it does burn. **Coke**, an artificial product made by heating bituminous coal in closed vessels or ovens, somewhat resembles anthracite in its properties. Only certain kinds of coal are suitable for the making of coke, the best being those which fuse readily into a mass in burning. Coal is hence spoken of as coking and non-coking, the former being the most valuable for certain purposes, as for use in steam-engines.

374. It is strange to reflect that coal, a substance so widely distributed over the earth, so necessary now to our ordinary comforts, and so essential to the commerce and industry of the world, should have been little known even in England a thousand years ago. It is indeed certain that it was worked at several places in Roman Britain, but it seems to have been little used in Anglo-Saxon times. The **first proper coal-mines** are, however, said to have been opened almost at the close of that century (1198) in Belgium, and it is long before we hear of a **trade in Newcastle coal.** In 1615 that trade had nevertheless attained considerable magnitude. It is then said to have employed four hundred vessels in distributing coal over England, about half of that number being engaged in supplying London alone. **In 1660** the total **coal production of England** is estimated at less than two and a quarter million tons, which, according to the estimate formed of the population of England and Wales at that time (about 5,500,000), is equal to **about two-fifths of a ton per head.**

375. The vast increase in the use of coal in recent years has been due chiefly to the requirements of modern factories, of railways and steamers, of blast furnaces and gasworks. At the beginning of the nineteenth century, after the invention of the steam-engine and its application to spinning machinery, but before the invention of steamboats, and still longer before the introduction of railways, and before coal gas came into general use for lighting, the production of coal in England is estimated to have been about ten million tons, equal to about five-eighths of a ton per head for the estimated population of the United Kingdom. The differences under these heads at the end of the nineteenth century are shown in the diagrams inserted in par. 16 of the introduction to the fourth edition of this work. These diagrams also afford a comparison with the two other leading coal-producing countries of the world, and the table on the following page extends this comparison.

376. There have been many speculations as to the **future of the coal supply of the world** as a whole and of particular countries. The vast extent of the coalfields still untouched removes, indeed, any fear as to the using up of the coal-supply of the world to the remote future. With regard to the coal-supply of any particular country or region, however, it must be borne in mind that **the pinch of coal-dearth begins**

—	Estimated area of coalfields in square miles	Production of coal. Millions of tons			Consumption. Tons per head
		1885	1890	1906	
China	Above 200,000[1]	?	? 3	? 3	? 0·75
United States .	280,000[2]	100	140	351	4·13
Canada	65,000[3]	2	3·1	7·7	2·28
India	35,000	1·5	2·7	8·4	?
New South Wales	24,000	2·9	3·1	6·6	?[4]
Russia	20,000[5]	4	6 0	18·4	0·16
United Kingdom	11,900	160	182	236	3·91
Spain	5,500	1	1·2	3·2	0·29
Japan	5,000	1·25	2·6	11·6	0·20
France	2,080	20	26	34·7	1·17
Austria-Hungary	1,790	8·2[6]	9·9	13·5	0·40
Germany . . .	1,770	57[6]	69[6]	119	1·76
Belgium . . .	510	17	20	21·5	2·75
New Zealand . .	?	0·5	0·6	1·6	1·84

to be felt as soon as the price of coal begins to rise relatively to the price in other countries or regions. As to the future of the coal production where large deposits of coal still remain to be utilised, it is impossible to prophesy; the conditions which determine whether a coalfield is worked or not are too numerous and uncertain. Much depends upon the quality of the coal, the situation of the coalfield, the ease with which the region can be supplied with coal from elsewhere, and much also on the habits of the people.

377. **IRON**. The uses of iron are too numerous to specify, and for the most part too familiar to need specifying. No other metal can fully supply its place. No other metal is produced in such abundance or over so large an area of the world. At the present day, indeed, none but the most backward tribes in a few out-of-the-way islands and corners are unacquainted with its working. Its use in the past goes back to a remote antiquity—how remote it is impossible to say. The most ancient relic of an iron implement which has been brought to light is a piece discovered in 1837 by Mr. J. R. Hill walled up in one side of the Great Pyramid of Gizeh. That carries us back about 5,000 years. The explanation of the rarity of the remains of ancient iron implements as compared with those of bronze is to be found in the fact that under the influence of air and moisture iron is eaten away so rapidly that its preservation for a long period is possible only under very exceptional conditions. So liable is it to disappear that, of all the numerous articles of iron that must have existed in ancient Egypt, the

[1] A rough but probably a very low estimate.
[2] Exclusive of lignite fields, of which there is an area, chiefly in North Dakota, Montana, Wyoming, Colorado, and New Mexico, of about 56,500 square miles.
[3] East of the Rocky Mountains.
[4] Total Australian Commonwealth, 7·5; consumption per head, 1·35.
[5] Exclusive of Siberia, Central Asia, and Caucasia.
[6] Exclusive of lignite, the production of which in Austria-Hungary makes up about two-thirds, in Germany about one-fifth of the total.

remnants that have been discovered do not weigh in all more than half a pound, and this in a country with a dry climate specially suited to the preservation of such articles.

378. The discoverers of the New World stated that the inhabitants of the parts which they first touched at, the West Indies and Darien, were unacquainted with iron, and their statements have frequently been made to apply to the whole of America, including the civilised empires of Mexico and Peru. But against this idea there is the express testimony of several contemporaries of the first explorers—testimony from which it appears that the working of iron was practised before the arrival of the Spaniards in various parts of the American continent, and there is evidence of other kinds to show that it must have been so in other parts regarding which we have no direct statements on this head.

379. But ancient and widespread as the iron industry is, its rapid growth in modern times, and in particular since the close of the eighteenth century, is an astonishing fact, or would be so if we did not bear in mind the other great developments in industry and commerce within that period. **In 1740 the whole production of iron in England** is estimated to have been only **about 18,000 tons**; even in 1796, after the introduction of spinning machinery, only 125,000 tons. Since then the annual production of the United Kingdom has in certain years exceeded eight and a half million tons. Such is the result of the vast demand for this material which has arisen from its use in machinery, railways, shipbuilding and the making of bridges and other structures. Iron is, in fact, the second of the two great material factors concerned in maintaining modern industry and commerce on a large scale, coal being the other.

380. The history of iron in many of its details is of singular interest, not only as showing how the volume of iron production has been raised to its present pitch, but also because some of the facts in that history have had an important effect on the geographical distribution of the industry.

381. Iron, it must here be explained, is rarely to be found pure. It has almost always to be extracted from ores, which vary greatly in their richness and the nature of the other substances with which the iron is combined. The ores have to be smelted or reduced to a metallic condition by heat and chemical action, and most of the iron then sinks to the bottom of the furnace and is run off into moulds. This is what is called **pig-iron** or **cast-iron**, and is never pure. It always contains a considerable proportion of a substance called carbon, of which pure charcoal is one of the forms; sometimes it contains substances much more injurious to its quality, the most prejudicial being **sulphur** and **phosphorus**. Even the carbon is injurious to some extent, and renders cast-iron brittle and unfit for use in the making of anything which has to stand a severe strain. It is for this reason that cast-iron is

converted into **wrought or malleable iron** by driving out almost all the carbon it contains. This is usually done by a process called **puddling**, which consists in remelting the cast-iron on the hearth of a furnace, and stirring it about when molten with a rake, which causes the carbon to escape and get burnt up in the intensely heated air of the furnace. As the carbon escapes the fluid becomes pasty, and the iron is then brought away in large lumps, and afterwards hammered into rude slabs called **blooms**, and rolled out to form bars, sheets, &c. In this form of iron there remains an admixture of slag or 'cinder.'

382. The material so formed is very tenacious, and tolerably hard, but for some purposes not sufficiently hard. For the making of weapons, and cutlery of all sorts, a kind of iron is required which besides being very tenacious must also be flexible, elastic, and very hard; and for these and other purposes iron is converted into **steel**, which is nothing else than a form of iron containing a small proportion of carbon. Before the invention of the processes described below (391–2) for introducing a desired proportion of carbon on a large scale, the term steel was applied only to iron containing from 0·8 to 1·5 per cent. of carbon; but these processes have introduced new varieties of iron, which caused at first some confusion in the nomenclature. This has at last been finally settled. The name of weld-steel is given to all varieties of iron made by the old puddling process above described, but containing from 0·8 to 2 per cent. of carbon as well as an admixture of slag. The best steel, however, made by the process described in par. 390 is free from slag, and the new processes referred to have led to the production of a kind of iron containing less than 0·3 per cent. of carbon but quite free from slag. This is very malleable, like wrought iron, but lacks the hardening power of the varieties of iron to which the name of steel was formerly confined. On account of its high quality the name of steel has been conceded to it, and it is now known as **mild steel** or **ingot** iron. Other slagless irons containing not more than 2 per cent. of carbon are known as half-hard steels.

383. The history of the iron industry consists in a gradual series of improvements in the methods by which all these processes are carried on. Only a few of the great steps in advance can here be mentioned; but with reference to these it ought to be explained that the most important of these improvements, associated with the names of certain inventors, are in many cases only slight modifications of methods which in the course of the gradual development of this industry had been previously suggested; modifications, however, which were just what was needed to make the methods practically useful (comp. 92).

384. In ancient times, when the methods of working iron were very defective, good iron could be made only from the best ores, and hence districts containing ores of fine quality had the principal trade in iron. During the early history of Greece certain tribes inhabiting the northern slopes of the tableland of Asia Minor, to the west of

Trebizond, among others the Chalybes, seem to have carried on a large trade in iron for this reason, and from them the Greeks derived their word *Chalybs* for hard iron or steel. To the Romans were known many deposits of iron ore, including the rich ores of Bilbao, in the north of Spain.

385. Remains of Roman ironworks are found in various parts of Great Britain, but so imperfect were their methods of smelting, so small a proportion of the iron was obtained from the ore, that the slag or refuse material from the smelting furnaces of the Forest of Dean, in Gloucestershire, supplied at a later period the only ore required for the furnaces of that region for a period of between two and three hundred years. At the same time, so expensive were these old Roman methods, that, according to an experiment made by the Austrian Count Wurmbrand, if these same methods were practised at the present day a ton of iron could not be made for less than 200*l*.

386. Down to a comparatively recent date one reason of the limited and costly production of iron was that wood or charcoal was the only fuel used in smelting; and this fact had an important effect both on the geographical distribution of the iron industry, and the aspect of those regions in which that industry was long pursued. Iron could be smelted only in the neighbourhood of forests, and in process of time forests were cleared in feeding the furnaces. The forest from which the Weald takes its name perished in supplying fuel to the iron-furnaces of Kent and Sussex, the last of which was blown out early in the nineteenth century. An English parliamentary report of the year 1719 makes strong complaint of the devastations wrought by the ironworks in the counties of Warwick, Stafford, Worcester, Hereford, Monmouth, Gloucester, and Salop. About twenty years later the English import of foreign iron was computed at about 20,000 tons annually—ten per cent. more than the home production (379). The greater abundance of wood in Germany as compared with England was one important reason why the iron industry of the former country was greater than that of the latter even as late as the earlier part of the eighteenth century.

387. Coal was first used with practical success in the smelting of iron by Dud Dudley (son of Lord Dudley) in 1619, but the practice was then followed only by himself, and the knowledge of it died with him. The practice was revived by the Darbys of Coalbrookdale early in the eighteenth century, but the process was kept a secret by them, and it was not till after the middle of that century that it became generally known. Though a great economy in fuel is effected by this means, coal, even in the improved furnaces of the present day, does not make so pure an iron as charcoal, inasmuch as it usually contains sulphur and other ingredients more or less noxious. In Sweden and Russia, the two European countries richest in forests, charcoal is still used in iron smelting-works, and to this fact the high quality of Swedish and some of the Russian iron is partly due.

388. A further economy in the use of fuel is effected by the employment of **coke**, which is, besides, a better form of fuel for the purpose, as containing no sulphur (381), and in the United States by the employment of **petroleum** and **natural gas** (898). Besides coal or other fuel, it is necessary in the case of most kinds of iron ore to put into the smelting- or blast-furnace along with the ore a certain quantity of a material intended to facilitate the reduction. The material so employed, called a **flux**, is generally **limestone or lime**; and consequently facilities for obtaining this mineral form an important geographical factor affecting the prosperity of the iron industry in different places. For some kinds of ore, as for that called **red hematito**, which contains 55–70 per cent. of iron, this is not always required. Most kinds of ore, too, require to be **roasted** previously to being put in the blast-furnace—an operation performed in kilns or by laying out the ore in a heap mixed with coal in the open air and setting fire to the heap at the end from which the prevailing wind blows. In the case of **blackband iron ore** (491), there is generally enough matter of the nature of coal in the ore to render the addition of coal unnecessary in roasting. The effect of the roasting is to reduce the bulk of the ore which has to be put into the blast-furnace, and at the same time to remove by burning most of the sulphur and other substances that can be volatilised. For red hematite this operation is considered unnecessary.

389. After the introduction of coal and coke in smelting, the next great step in the economising of fuel was due to the invention of the **hot-blast**, that is, the practice of raising the air used in blowing the smelting-furnaces to a high temperature before introducing it into the furnace. This invention, due to Mr. Neilson of Glasgow, was first applied in 1828, and enables the same quantity of fuel to smelt more iron than could be done with a cold-blast. The saving by this means is not so great as was at first claimed, but has been increased by raising still higher the temperature of the blast. About 1870, in the best-constructed furnaces the blast had a temperature of only about 800° F., but afterwards it was sometimes raised to as high as 1,650° F. Such high temperatures were, however, found to be rapidly destructive to 'pipe-stoves' of the old type, and these are consequently now superseded by a new type of furnace in which the blast is usually maintained between 900° and 1,200°, occasionally at as much as 1,400° F. Blast-furnaces have also been enlarged and improved in construction. In 1880 an outturn of 115 tons of iron per day was exceptionally large, in 1898 a furnace at Pittsburg, U.S.A., made as much as 711 tons in a day. The waste gas which used to be seen burning at the top of the furnaces is now utilised to heat the boilers of the engine employed to work the blast and the hot-air stoves—an idea which originated in France in 1814, though it has been applied in a sufficiently simple matter only since about 1850 (first in South Wales). By all these means the consumption of coal has been so greatly reduced that,

whereas in 1796 six tons of coal were required to produce one ton of iron, two tons of coal (one of coke) now suffice for that production. A further great economy in the iron industry has been made where the iron is worked up in the same establishments in which it is extracted from the ore. The gas of the blast-furnaces is then employed also to drive the rolling-mills and other engines, and the heat of the molten cast iron is not lost till the iron is delivered as rails or in some other form. Recently iron ores have also been smelted by electricity.[1]

390. Further great developments of the iron industry have been due to the inventions which have done so much to cheapen the production and extend the use of **steel** as compared with wrought iron. The old **method of making steel** by the process called **cementation** is still the best, and indeed the only method by which steel of the quality required for making good cutlery can be manufactured. This method consists in sealing up bars of iron in fireclay troughs along with a quantity of charcoal, in which the bars of wrought-iron are embedded, each separated by a layer of charcoal from the others, and exposing them thus to a high temperature for a week or ten days, according to the quality of steel required. At the end of the period the iron is found to have combined with the requisite amount of carbon, but to have become porous and rough on the surface, on which account it is known as **blistered steel**. This, after being condensed by hammering and rolling, and fused in crucibles to get rid of all traces of slag or cinder, forms the finest kind of cast steel. The hardest steel thus made has about 1·2 per cent. of carbon. The process, from its nature, is obviously a costly one.

391. There are now many methods of producing **cast steel** on a large scale, and three of these are sufficiently widely practised to have a geographical interest. The first of these is that which is associated with the name of Sir Henry Bessemer, being employed in the production of what is called **Bessemer steel**, although the method as now practised in most of the great iron-countries involves an important improvement introduced by Mr. Mushet. The steps taken in this method are the following. Molten pig-iron is run into a large pear-shaped vessel called a converter, made of wrought-iron, and lined with a thick coating of some material not readily acted on by fire, and having a flat bottom, and a mouth at the narrow end. The lining-material generally used is known as **gannister**, a kind of sandstone which is ground to powder and moistened, when, after being heated, it forms a very compact, non-crumbling mass, extremely difficult to melt. In the bottom of the converter there are a number of small holes through which cold air is blown with an amount of force strong enough to prevent the molten iron from falling through, and the air

[1] Mostly only on a small scale, but in a valley of the French Alps near Grenoble there are electric blast-furnaces each capable of producing from the ore 12 tons of steel in 24 hours. (Note written in 1903. See Introd. to 8th ed., par. 59.)

in passing through the iron burns the carbon which it contains, as well as the silicon, another substance which is always present in greater or less amount, and is highly injurious when the amount is great. So rapid is the combustion that the heat caused thereby is great enough to keep even malleable iron molten. This converter is the invention of Mr. (afterwards Sir Henry) Bessemer. When the carbon is all consumed the converter is turned on pivots into a horizontal position, and a compound of iron containing the necessary proportion of carbon for conversion into steel is added, and is then thoroughly mixed with the iron by a short repetition of the blowing. As originally devised, this process was found to be unsatisfactory except in the case of a few ores. The resulting product was very brittle, and Mr. Mushet's improvement consisted in adding the carbon in a compound containing manganese, which serves to correct the fault to which this brittleness is due. The compounds employed are **spiegeleisen** and **ferro-manganese**, which are made from certain iron ores rich in manganese, such as are found in Styria, Westphalia, the Urals, Sweden, and elsewhere. When the ore used in making the pig-iron put into the converter itself contains a sufficient amount of manganese, the use of spiegeleisen or ferro-manganese is not necessary. The amount of iron that may be converted into steel in a single converter at one time by this process varies from three to ten [1] tons, according to the capacity of the converter.

392. Another process widely used for the purpose is that known as the **Siemens-Martin** or **open-hearth process**, which in so far resembles the Bessemer process that molten pig-iron is first deprived of carbon by means of air, and the necessary amount of carbon is afterwards restored by the addition of molten spiegeleisen or ferro-manganese, but differs in this, that the operations are performed in a different kind of furnace, in which the air employed to remove the carbon plays over the molten metal instead of being blown through it.[2]

393. Even with the improvement of Mushet these two processes are not applicable to all kinds of pig-iron. Neither of them removes phosphorus if the pig-iron happens to contain it; and as steel is rendered brittle by even a very slight proportion of this ingredient (less than $\frac{1}{500}$ part being enough to render it unfitted for many purposes for which steel is required), the original processes can be applied only to iron made from ores in which phosphorus is not contained, or is present only in very small amount indeed. Such ores are known comprehensively as **Bessemer ores**. In the Old World, the only ore from which iron of this quality can be made in large quantity is the hematite, which occurs in the north-west of England, and is found also to a limited extent in the Prussian province of Westphalia, in Styria (616), and in Sweden, but the only other generally

[1] The limit about 1890; in 1902 there were converters of a capacity of 20 tons.
[2] Such furnaces may now (1902) have a capacity of as much as 100 tons.

available sources of which are the island of Elba, the north of Spain, and Algeria. So long, therefore, as no process was known for making cast steel on a large scale so as to overcome the above-mentioned drawback, the geographical distribution of these ores was obviously greatly in favour of the English iron and steel industry, for not only did England herself possess stores of the valuable ore in the most convenient situation, but ores from Italy, Spain, and Algeria could be landed after a sea-voyage close beside the blast-furnaces of Newport and Middlesbrough, whereas on the continent a railway journey, or at least a transhipment to river or canal boats, was in most cases necessary to bring them to the districts where the iron industry is pursued. Hence, in Germany, for example, ores could be sent for this purpose no farther inland than the iron-working districts in the neighbourhood of the Rhine (Essen and the surrounding towns—**581***a*).

394. It was accordingly a discovery of the highest importance for the future distribution of the iron and steel industry when a method was devised by which phosphorus could be removed from the pig-iron in the process of converting it into steel. A practicable method of doing this was invented by Mr. Thomas and Mr. Gilchrist of Middlesbrough, in association with others. The method consists in using for the lining of an ordinary Bessemer converter a composition which, while serving the other purposes of the lining, has such a chemical action as to remove any phosphorus that may be present in the iron poured into the converter. Lime is mixed with the lining to serve as what chemists call a 'base,' with which the phosphorus, quitting the iron, may combine; and the process is hence known as the **basic process.** If the proportion of phosphorus be too great to be removed by that means alone, additional lime is added in some form in the converter along with the metal. This process was first practically applied in 1879, and besides making the ores extracted round Middlesbrough (the Cleveland ores) for the first time available for the manufacture of mild steel or ingot iron (**382**), has enabled the mainland of Europe to compete with the United Kingdom in the iron industry more keenly than hitherto.

395. The basic process was first applied in the United States in 1890, but has since then made rapid progress. In the United Kingdom it is not so largely adopted as it now is either on the continent or in the United States, the reason probably being that it is not so conveniently applied to the open-hearth as to the Bessemer method of making steel, and open-hearth plates are those which are preferred by shipbuilders, to whom is due the chief demand for British steel. New processes have, however, been devised for facilitating the manufacture of basic steel by the open-hearth method, and it is probable that the method will now gain ground in this country.

396. In recent years various compounds of steel with other metals have been made experimentally. The most promising of these is

nickel-steel, which has already got beyond the stage of experiment. The compound so called contains from 3 to 3·5 per cent. of nickel, and about 0·25 per cent. of carbon, and is much tougher and stronger than ordinary steel, and yet extremely ductile. This combination of properties causes nickel-steel to be regarded as the best material for the armour plates of war-vessels—at least when the outer surface is hardened by some carburizing process, followed by sudden cooling. **Manganese steel**, which contains from 12 to 14 per cent. of manganese and 1·5 per cent. of carbon, has extraordinary tenacity, but appears to be too expensive a product for ordinary use. This largely arises from its extreme and irreducible hardness, which necessitates its being cut by emery wheels instead of the ordinary tools. **Chrome steel** contains about 2 per cent. of chromium and 0·8 to 2 per cent. of carbon. When suddenly cooled it is not only extremely hard, but highly elastic, which makes it peculiarly suitable for use in the making of armour-piercing projectiles. It is also proof against the burglar's drill. **Tungsten steel** is a compound which remains hard at a temperature of even 750° F., and is hence well adapted for the manufacture of turning lathes used in cutting thick slices, a process in which the great friction develops very high temperatures. It contains from 5 to 10 per cent. of tungsten, with 1 to 2 per cent. of carbon.

397. From the nature of the **iron industry** as now pursued, it follows as a matter of course that it is most largely developed in those countries which stand first in commerce and manufacturing industry generally. This industry may, indeed, be taken as a pretty good index of the position held by the chief countries of the world in these respects; and hence the following table, relating to the iron-production of the five countries which in 1871–75 produced the largest amount of iron, has an interest not confined to the iron industry.[1] From this table it will be observed that the United Kingdom has been losing ground relatively to the other four countries. The production of iron in the United States from ores of every origin (native or foreign) for the first time exceeded that of the United Kingdom in 1890:—

Country	Average annual production of pig-iron in millions of tons				Percentage of total of five countries			
	1871–75	1876–80	1881–85	1901–05	1871–75	1876–80	1881–85	1901–05
U. Kingdom . .	6·46	6·66	8·10	8·77	52·0	49·9	44·2	21·8
U. States . . .	2·24	2·56	4·30	18·24	18·0	19·2	23·5	45·5
Germany[2] . .	1·92	2·15	3·36	9·32	15·4	16·1	18·3	23·2
France . . .	1·23	1·49	1·87	2·69	9·9	11·1	10·2	6·7
Belgium . . .	0·58	0·49	0·70	1·11	4·7	3·7	3·8	2·8
Total	12·43	13·35	18·33	40·13	100·0	100·0	100·0	100·0

[1] See also Introduction to the Fourth Edition, pars. 19–21. [2] See 590*a*.

398. Relatively to population Sweden has a large iron industry, due to the great abundance as well as to the excellent quality of its ores, and to the plentiful supply of charcoal fuel for smelting. For the last of the periods given in the preceding table, the countries entered therein are no longer the first five. The production of pig-iron in Russia [1] has exceeded that of Belgium since 1888, and that of France since 1899, and that of Austria-Hungary also got ahead of the Belgian production in 1889. The iron industry of Spain is now also growing rapidly. India and many of the colonies possess abundance of iron ore; but this industry, in which the value of the ore counts for little, and capital and science for a great deal, has little chance of being rapidly developed in new countries.

399. **PETROLEUM AND ITS PRODUCTS, with other allied substances.** Petroleum, which means rock-oil, is a general name given to oils which flow freely or are pumped from holes bored in the earth. From the crude oil as it issues from the earth numerous products having a great variety of uses are made by distillation and other processes, these products differing from one another in weight and fluidity, as well as in other properties. The names given to these products are variously used in different places, which is the source of a good deal of confusion. The name of **kerosene** is now very generally given to a **light kind of oil** which is that most abundantly produced **for use in lamps. Heavier kinds of oil**, to which various names are given, are better adapted for **heating** purposes, and **heavier oils still** are very abundantly produced for use as **lubricators** for machinery. These heavy oils are what are generally known in the United States as **paraffin oils**, but in England this name had previously been given to an oil prepared from a different material for lighting (408), and hence in this country the light petroleum of the Americans is frequently sold as paraffin oil. In the Russian territory of Trans-Caucasia the name of **astatki** is given to a comparatively thick residue which remains after the lighter oils have been removed, and is now largely used as fuel both for land and marine steam-engines in the neighbouring parts of Asia and Europe. The same use of petroleum is rapidly becoming more general both by sea and land, and has even (1902) been resorted to on some English railways.

400. The products that have now been mentioned are by far the most important of those derived from petroleum, and their importance is increasing every day. The **illuminating oils** derived from petroleum, together with the British paraffin oil, are **fast driving vegetable and animal oils out of the field** in almost all parts of the world. Even in the olive refineries of Italy, where, as in the other Mediterranean countries, olive-oil was the only lighting agent known in ancient times,

[1] The increase of the production of pig-iron in Russia has been very rapid. The average annual production increased from 386,000 tons in 1871–75 to 2,192,000 tons in 1896–1900, and 2,660,000 tons in 1901–1905.

the refiner now finds it cheaper and better to use petroleum for light than the product of his own olive-groves. **As a lubricating agent petroleum is equally victorious** in competition with oils of vegetable and animal origin, the heavy oils used for that purpose being less liable than other oils to spontaneous combustion, and not so apt to become gummy and adhesive, in consequence of which they remain longer efficient. Hence, even where not used alone for the purpose, they are frequently mixed with other kinds of oil to correct such defects as those just indicated.

401. Among the more important of the petroleum products obtained in less quantity are **gasolene**, a very fluid oil used in making an inflammable gas, and now largely manufactured under the name of **petrol** for use in the gas engines of motor carriages; **benzine** and **benzol**, employed as a solvent in the making of india-rubber and gutta-percha goods; **paraffin**, a white waxy-looking solid; **vaseline** and other ointments, largely used in medicine; and **rhigolene**, the most volatile of all petroleum oils, sometimes used in medicine to cause local insensibility from the cold which it produces by the rapidity of its evaporation. **Naphtha** might also be mentioned among petroleum products, but of all names used in connection with the petroleum industry this is perhaps the one that has the most diverse senses. Sometimes it is employed as a general name for any oil fit for burning that escapes from the ground; in the United States it is applied to certain grades of oil made from crude petroleum, and it is also applied to an inflammable fluid obtained from wood.

402. The **petroleum industry** on a great scale is entirely of modern, and indeed of comparatively recent origin, and has attained its present dimensions in consequence of the abundance of the supplies that have been discovered in certain regions, the great utility of its products, the ease with which it can be extracted from the earth and transmitted long distances in pipes, and the consequent cheapness of its products. The existence of petroleum was known even to the ancients, being mentioned by Herodotus, Plutarch, and Pliny; but the great development of the industry has taken place since the two great oil-fields already referred to, that of **Trans-Caucasia** and that of the **United States**, began to be worked. These two regions are now the two great rivals in the petroleum trade.

403. The **Trans-Caucasian oil-fields** belong to a larger region, extending from the Crimea in the north-west along both sides of the Caucasus, and along the northern frontier of Persia to Merv and Sarakhs in the south-east, a region in which petroleum is known to exist at many points; but there are two small districts, one near the Caspian Sea and one near the Black Sea, both on the south side of the Caucasus Mountains, in which the supply of oil in this region is peculiarly abundant. One of these is the district **round Baku**, on the peninsula of Apsheron, which juts eastwards into the Caspian Sea. In

this district, which is by far the richer of the two, inflammable oils have been known to exist from a very remote period, and gases burning constantly as they escaped from the earth were visited for ages by Persian fire-worshippers; but it was not till long after this territory finally passed from Persia to Russia, in the beginning of the nineteenth century, that any attempt was made to utilise commercially its wealth in oil. Of late years, however, its working has been taken in hand in good earnest, and its production has increased with great rapidity.[1] No other part of the world yet known contains such a large proportion of **free-flowing wells** (that is, wells from which the oil does not need to be pumped), or individual wells producing so large a quantity of oil in a given time. More than one of the Baku wells has been known to yield of itself upwards of 1,000,000 gallons per day for several days together. With such force does the oil sometimes issue at the first rush from a new boring that the whole boring-apparatus, weighing a ton and a half, is blown away.

404. The crude oil from the wells is **run by means of pipes directly into the refineries**, whence the products are conveyed either in carriages made in the form of tanks, on the Trans-Caucasian railway, to the ports of Batum and Poti on the Black Sea, or to specially constructed tank-steamers which navigate the Black Sea and the Volga. Similar steamers are employed to convey the oil from the Black Sea to distant ports. In the early part of 1900 a pipe line upwards of 140 miles in length was opened from Baku to Mikhailovo, near the eastern end of the Suram tunnel (710). Through it is to be passed only refined oil, and the pipe is estimated to have a capacity of upwards of 300 million gallons per year.

405. Petroleum is produced also in other parts of Trans-Caucasia, and more abundantly in the Groznyi district (Terek terr.) in the east and the Maikop district (Kuban terr.) in the west of Cis-Caucasia. Groznyi is connected by rail with Petrofsk, on the Caspian, and **Novorossiisk**, which possesses the finest natural harbour on the eastern shores of the Black Sea.

406. **The petroleum industry of the United States** is of comparatively recent origin, and has increased very rapidly since 1900.[2] **The great oil region of the United States** is a strip of about 160 miles in length, and 40 miles broad in the middle, stretching from south-west to north-east in the west of Pennsylvania and New York. Oil was observed on the surface of the ground within this region as far back as 1819, but the first company for utilising the oil was formed in 1853, and at first the only method of collecting the oil was by spreading cloths over the ground to soak it up. **Oil was first reached by boring in 1859**, and it is since then that the oil industry of the United States

[1] In 1832 the district produced only 48 barrels of crude oil. In 1883 the total production of the Russian Empire (nearly all in this district) was still under 250 million gallons. In 1903 it attained 2,955 million gallons, but owing to disturbances it fell to 1,924 million gallons in 1905, rising again to 2,254 million gallons in 1909.

[2] In 1883 the total production was 820, in 1909, 6,323 million gallons.

has sprung up. Now there are about 20,000 wells in districts scattered all over the region, with about 4,000 miles of pipes, which run their products into great central refineries, and thence to the great oil-markets. What are called **Pipe Line Certificates** are issued to the proprietors of the oil-wells in proportion to the amount of crude oil which they run into the pipes for refining. Petroleum is now largely used in and near the oil region in iron-smelting and working, glass-making, and other industrial operations. (See also **898**.) Even as late as 1885 this region produced nineteen-twentieths of the petroleum of the country, but the production there has since 1900 greatly declined, the increase that has more than counterbalanced this decline having been chiefly in California (southern), the Lima oil-field (north-eastern Indiana and north-western Ohio), Texas, Kansas, Illinois, and other States. In the beginning of 1901 Texas, which already produced petroleum at Corsicana about 250 miles from the Gulf of Mexico, had its production greatly increased through the discovery of a very productive district at Beaumont, within 18 miles of Port Arthur in the extreme south-east of the State.

406a. Fully half the refined oil produced in the United States is exported, and the markets are scattered all over the world, as is only natural in the case of a commodity having such important uses. Hitherto the **markets of Europe**, almost all countries belonging to which import more or less American oil, have taken the largest share of the whole American export, and it is these markets that are **now largely supplied by the Caucasian oil-fields.**

407. Besides the regions already referred to, many other parts of the world produce petroleum, though few in sufficient quantity to give it great commercial value. **In Europe**, the principal districts producing **mineral oil** lie on the outer slopes of the Carpathian Mountains, in **Austrian Galicia and Roumania.**[1] **Germany** (Hanover) and **Italy** have also been known for some time to possess petroleum wells, and a well has recently been discovered in France. In America, **Canada** has large supplies of petroleum, principally in the Province of **Ontario**, and these are important for the home demand, though they yield little for export. The **West Indies**, and also **Venezuela, Peru**, and other South American countries, likewise supply petroleum in greater or less abundance. **In Asia, Burma**[1] has long been known for its mineral oil, affording as it did the chief supply before the great development of the oil-fields of Trans-Caucasia and the United States. Important supplies are now also obtained in north-eastern **Sumatra,**[1] eastern **Java,**[1] and in **Japan.**[1] Mineral oils have likewise been discovered in considerable quantity at various points in the east of **New South Wales,**

[1] In all these regions the production was rapidly increasing at the end of the nineteenth century, but in 1908 the total estimated production of Europe and Asia outside of Caucasia was little more than one-half of the Caucasian production, and a third of that of the United States.

and in New Zealand, but these are mostly obtained from rocks similar to those which yield the paraffin oil of Britain.

408. The **paraffin** oil of Britain is a substance essentially similar to petroleum, and has the same uses, the lighter kinds being employed for illumination, the heavier for lubrication. Instead of gushing out of the earth, however, or being pumped out, it is extracted by distillation from solid minerals; that is, the solid minerals are heated till the oils evaporate, and the oils are then re-condensed in separate chambers. The founder of this industry was Mr. James Young, who, while engaged in working a natural petroleum which flowed from the sandstone roof of a coal-mine, at Alfreton in Derbyshire, conceived the idea that the oil might be profitably extracted from coal. This led to experiments, and in 1850 to his taking out a patent for the extraction both of oil and the solid substance **paraffin** from coal. These substances are **now chiefly obtained from bituminous shales**, and the principal seat of the industry is a district extending from Linlithgowshire through Midlothian to the west of Fife in Scotland, where these minerals are very abundant. After distillation the solid paraffin crystallises in the process of cooling, and is afterwards compressed and refined. It is chiefly used in making candles, which rival wax candles in the brilliancy of their light. It is from bituminous shales, which are very abundant in New South Wales, that the oil there called kerosene is obtained—an oil used in that colony both for burning in lamps, and for mixing with coal in making coal-gas.

408*a*. Ozokerit or earth-wax is a natural product resembling solid paraffin. It occurs in large quantities near the Caspian Sea, but the chief commercial supplies are drawn from Drohobycz and other places in Austrian Galicia. It is very difficult to refine, but yields a peculiarly fine kind of wax very suitable for making candles of a high melting-point. The light given by such candles is as 10 : 7·5 of that from sperm, and as 10 : 7 of that from wax candles.

409. Asphalt is a solid or nearly solid substance which results from the thickening of petroleum through the absorption of oxygen, and is hence met with in nature either as a superficial layer above deposits of petroleum exposed to the air, or entirely occupying the place of such deposits so exposed. Its chief use is in paving, for which purpose the asphalt of the **Val de Travers in** the Swiss **Jura** (canton of **Neuchâtel**) is the most valued material. It is also obtained in the canton of **Vaud**, and in Germany, France, Italy, and some other European countries. Algeria likewise supplies a considerable quantity of this substance to Great Britain, and a still larger quantity is obtained from the British West Indies (**Barbados and Trinidad**). Among other places where it is found are the neighbourhood of the **Dead Sea** (hence anciently sometimes known as the Asphalt Lake) and **Venezuela**.

410. GOLD AND SILVER. The following table, based on esti-

mates for the year 1908, published by the director of mints of the United States of America, shows in order of importance in respect of the total production of the precious metals the countries and parts of the world which in that year produced as much as 100,000*l.* worth of either gold or silver. The figures represent millions and decimals of a million sterling. G. = Gold; S. = Silver; T. = Total.

Gold and Silver Production of the World, estimated 1908

(Based on estimates published by the Director of the Mint, U.S. of America, 1909)
£ millions

—	G.	S.	T.	—	G.	S.	T.	—	G.	S.	T.
Africa . . .	33·3	0·1	33·4	Peru . . .	·1	1·0	1·1	Fr. Guiana .	·5	—	·5
United States	18·9	5·6	24·5	Japan . . .	·6	·4	1·0	DutchE.Indies	·4	·1	·5
Australasia .	14·7	1·8	16·5	Colombia. .	·7	·1	·8	Brazil . . .	·4	—	·4
Mexico . .	4·5	7·9	12·4	Cen. America	·6	·2	·8	Spain . . .	—	·4	·4
Russia . .	5·6	—	5·6	Austria-Hung.	·5	·2	·7	Brit. Guiana	·3	—	·3
Canada . . .	2·0	2·4	4·4	Bolivia&Chile	·1	·6	·7	Brit. E. Indies			
India . . .	2·1	—	2·1	Korea . . .	·6	—	·6	(exclg. India)	·3	—	·3
China . . .	1·7	—	1·7	Germany . .	—	·5	·5	D. Guiana .	·1	—	·1

Note.—Conversion is made at 5 dollars = £1. Silver is taken at *commercial* value as distinguished from *coinage* value.

Total value of gold, £88·386; silver, £21·737. Total of gold and silver, £110·123.

In 1898, the year before the outbreak of the war in South Africa, the value of the gold produced in the Transvaal was 16,044,000*l.*

411. Gold generally occurs either in **alluvial** deposits (into which it has been washed by the degradation of the rocks from which the deposits are derived) **or in quartz veins** in the free state. Often it is associated with various metallic sulphides, chiefly iron and copper pyrites, either in quartz-veins or in other forms in which these ores occur, but it is seldom worth extracting except from quartz-veins. Alluvial gold occurs in the form of larger or smaller pieces (**nuggets**) scattered amidst the detritus. From quartz-veins and other hard rocks gold has to be obtained by stamping or crushing, a process involving more expensive machinery than is used in digging for alluvial gold; but quartz-veins are sometimes capable of being profitably worked to a depth of 2,000 feet or more.

412. Silver ores generally occur **in veins, or irregular** deposits. But with regard to the occurrence of this metal, it is important that the silver-lead ore (**415**) sometimes occurs in great quantity in large '**pockets**' or cavities in limestone rocks, which are very productive for a time, but are soon exhausted. It is from such chambers that the greater part of the silver of the United States is now obtained, and the production of the United States, having first been raised by this fact to an enormous extent, has now begun to show a less rapid rate of increase. It is since the discovery of the famous Comstock lode in Nevada in 1859 that the United States rose into importance as a silver-producing country. Already the deposits first discovered

are becoming exhausted, and it is only by new discoveries that the silver-production of that country has been kept from declining.

413. Another matter of importance with reference to the production of silver is that a large production of the silver of the world —43 per cent., according to an estimate of Professor Roberts-Austen for 1883—is derived from the **desilverisation** of ores worked for other metals, principally **lead and copper.** It is by the desilverisation of copper ore (at Mansfeld in the Harz) that a large proportion of the silver of Germany is produced.

414. LEAD. The consumption of this metal has greatly increased since the beginning of the nineteenth century in consequence of its use for the smaller gas and water pipes, and in various branches of the arts, as in lining the chambers used in making sulphuric acid (**460**). The chief countries of its **production** are the **United States, Australia, Spain,** and **Mexico,**[1] followed at a considerable distance by Germany, France, Belgium, Canada, and Austria. The high position formerly taken by the United Kingdom in this industry has now been altered by the fact that lead ores are now generally treated in the countries in which they are produced, so that the former large import of lead ores is now replaced by that of pig and sheet lead (chiefly from Spain, Australia, and the United States). The value of ores of lead varies greatly.

415. There are various industries subsidiary to that in lead. The most important of these is the **extraction of silver** (**413**), a small proportion of which is nearly always contained in galena, the chief lead ore, a compound of lead and sulphur. **White lead,** which is very largely used in making painters' colours and in making the glaze on earthenware, is a carbonate of lead or a compound of lead and carbonic acid. **Litharge** is a compound of lead and oxygen, and is a yellowish substance used in making the glaze on earthenware and for other purposes. One form of this is called **massicot,** and from it is made by heating another compound called **red lead or minium,** which contains a greater proportion of oxygen, and is largely used in the making of flint glass and porcelain, as well as in making red paint.

416. COPPER. This metal is found in many if not in most countries of the world, sometimes pure (the native copper occasionally forming huge masses), more frequently in the form of ores, which vary greatly in richness. In 1867 **Chile,** the northern half of which is intersected in every direction by veins of copper, contributed two-thirds of the entire copper-production of the world; but owing to the discovery of rich deposits of copper in other regions less remote from the great markets of the world, its share of the total copper-production has been greatly reduced. As late as 1880 it still stood first in

[1] In 1908, out of a total estimated production of 1,023,000 tons, the share of the United States was 282,000 tons, Australia 197,000 tons, Spain 170,000, and Mexico 127,000.

the list of copper-producing countries, but now (1902) the **United States** produces more than half the copper of the world—Spain and Portugal,[1] Japan, Chile, Germany, Australia (especially South Australia), being the producing countries next in importance. The production of the mines of the United Kingdom is now quite unimportant.

417. The production of copper in England from native ores has greatly declined since about 1840, but there is a large import of foreign ores and ores which have undergone some preliminary treatment into this country, where it is converted into pure copper, chiefly at Swansea (**516**). The greater part of the import of impure copper is in the form of **regulus** and **precipitate of copper**, both of these being copper ores partially refined, but by different methods of treatment. Copper in these forms is **chiefly imported from Spain and the United States.** Raw copper ore is chiefly imported from Venezuela and the Cape Colony; and there is also a large import of metallic copper, unwrought, from Chile and the Australian colonies.

418. Being an excellent conductor of electricity, copper has had its use greatly extended of late years in making telegraph-wires for underground communication and marine cables. It is one of the ingredients in the two important alloys known as **bronze** and **brass**, the former composed of copper and tin (a very hard compound), and the latter of copper and zinc.

419. ZINC. This metal was first known in Europe only as an import from China and India, where it had long been employed in the manufacture of brass. It is only since about the middle of the eighteenth century that the methods of extracting the metal from the ore and treating it after extraction have been discovered in this continent. **Prussia** (**581*b***) and **Belgium** (**557**) are now the two European countries which produce the greatest quantity of this metal, chiefly from ores found in the countries themselves. They are estimated to furnish together about four-fifths of the production of Europe, fully two-thirds of that of the world. In the **United Kingdom**, zinc ores are produced chiefly in the counties of Denbigh, Cardigan, and Cumberland, and the Isle of Man. Ores are likewise imported from various European countries, but the main import of this metal is in the form of crude zinc, or **spelter**, chiefly from Germany, Holland, and Belgium; that from Holland, and part of that from Belgium, being, no doubt, of German origin. From the same countries there is also a large import of articles manufactured from zinc. A large quantity of zinc is likewise produced in the United States, chiefly in a district in the extreme south-east of Kansas and the south-west of Missouri.

420. TIN. The tin-mines and other deposits of **Cornwall** and the adjacent parts of **Devonshire**, which perhaps supplied the Phœnicians with tin three thousand years ago, continued to be almost the sole source of supply of this metal till within the last two hundred years

[1] In 1908 Spain followed the United States in the production of copper.

or so. The region just referred to is still the only important place of production in Europe, but important deposits of the ores of this metal are now known to exist in many other parts of the world, and the United Kingdom now imports much more tin than it produces. The principal sources of this import are the **Straits Settlements** (**756*a***). The islands of **Banka** and **Billiton**, belonging to the Dutch East Indies, also yield large quantities of tin, but this is sent mainly to Holland, whence considerable quantities are re-exported to the United Kingdom. New South Wales, Victoria, and all the other Australian states, including Tasmania, produce more or less tin. In South America, Bolivia, Peru, and other countries are known to be rich in tin ores, and Bolivia is already a large producer.[1]

Tin ore is met with either in veins (or lodes) in the rock, or scattered about in alluvial deposits. The former is called **mine-tin**, the latter **stream-tin**. The stream-tin, being generally near the surface, is naturally the easiest to obtain where it is abundant; and it is the abundance of such deposits in the Straits Settlements that makes that part of the world such an important source of supply at the present day. Tin is mostly imported in the metallic state. One of the chief uses of tin is to cover sheets of iron with a coating which serves as a protection against rust, and thus to form **tin-plate**.

421. QUICKSILVER, or mercury, the only fluid metal, has long been principally obtained in Europe from the Spanish mines of **Almaden** in the Sierra Morena, which were worked even under the Romans. In 1887 Spain furnished more than four-fifths[2] of the total quantity of this metal imported into Great Britain. The other European countries which produce much of this metal are **Italy** (from mines in Tuscany and Venetia) and **Austria-Hungary**, chiefly from the long celebrated mines of **Idria** in Carniola. Since 1850, when the celebrated mines of **New Almaden** in California were opened, large quantities of mercury have also been produced in the United States, the mines of which country have in many years furnished more than those of Spain and Austria together. The export from the United States is not proportionately large, and since 1877 there has been a great decline in its total value. Quicksilver is also produced in Servia, Russia, China, Mexico, and Peru.

The uses of mercury are various. In its pure state it is chiefly employed in the making of scientific instruments. Combined with other metals, it forms what are called **amalgams**, which are soft and easily fusible. An amalgam of mercury and tin was once largely used in the silvering of mirrors, but is now generally replaced by electro-deposits of silver. **In mining for silver and gold** these metals are frequently extracted by employing mercury to form amalgams with

[1] Out of an estimated total production in 1908 of 113,000 tons, the Federated Malay States supplied above 51,000 tons; the Dutch East Indies, Banka and Billiton, above 17,000 tons; and Bolivia nearly 18,000 tons.

[2] So also in 1902.

them, and the large amount of mercury required for this purpose in the extensive silver-mines of California and Nevada, near the chief seat of the United States' production of quicksilver, is one great cause of the smallness of the export from the United States of the latter metal.

422. SALT. This product, so universally used and so widely distributed, is more an article of local production in almost all countries than an article of international commerce. It is obtained, as is well known, both from deposits on the land (rock-salt and brine-pits) and by the evaporation of sea-water. In the production of salt the United States, the United Kingdom,[1] India, Germany, Russia, France, Spain, Austria-Hungary, Italy, Portugal, are the leading countries. The United Kingdom has by far the largest consumption of salt per head, which is in a great measure due to the use of this mineral in the arts (457–58). The chief salt-exporting countries are the United Kingdom, Spain, Portugal, and Germany. Portugal is noted for the excellence of its bay-salt. In tropical countries with an excess of rain, there is apt to be a deficiency of salt, and hence India imports (most largely from the United Kingdom) upwards of 400,000 tons annually.

423. MINOR MINERALS. Among these the following have some commercial importance :—(1) **Antimony**, employed to give hardness to softer metals in various alloys, more particularly in the making of type-metal, bell-metal, and Britannia metal, and also used by itself in the making of concave mirrors for astronomical purposes ; produced in Great Britain from ores obtained principally from Japan and Borneo (Saráwak). (2) **Manganese**, an indispensable constituent of certain compounds of great importance in the making of steel (391). One of its ores, known as the black oxide of manganese or pyrolusite, is also largely used in the manufacture of bleaching-powder (461), and in glass-making as a decoloriser. This ore is obtained from various parts of the world, but at present is most abundantly imported into Great Britain from India, Trans-Caucasia, and Brazil. A manganese ore suitable for the making of ferro-manganese (391) is worked in Merioneth and elsewhere in Great Britain. In the United States ores of this metal are worked chiefly in Virginia, Georgia, and Arkansas. Recently the metal manganese has come to be used in various alloys. With copper it produces a very tenacious kind of bronze; with copper and zinc, sometimes with the addition of a little iron and nickel, a substance resembling nickel. (See also 396.) (3) **Chromium**, a metal occurring in nature chiefly in the form of chromate of iron or chrome iron ore, which is used in small quantity in making a kind of steel of great tenacity, and in the manufacture of bichromate of potash from which various pigments are derived. The ore is produced in the island of Unst in Shetland, and occurs elsewhere in Scotland. It is imported into Great Britain from Bosnia and the south-west of Asia Minor. In the United States it is produced in California, but that country also is mainly dependent on foreign supplies. (4) **Arsenic** is another metal chiefly used, not by itself but in one of its compounds, with oxygen—the so-called **arsenious acid**, which is largely manufactured in Germany, England, and elsewhere for the sake of the green colouring-matter it affords for wall-papers and for other purposes. (5) **Bismuth**, chiefly used to give increased fusibility to various metallic alloys, and in the

[1] Formerly the United Kingdom ranked first in the production of this mineral, producing more than 2,000,000 tons annually, but there has been a decline since 1894 and larger quantities are now produced in the United States and Germany.

manufacture of certain colouring-matters, is produced on both sides of the Erzgebirge (that is, in **Saxony and Bohemia**). The whole production of the world is estimated at less than 100 tons. (6) **Platinum**, a rare metal, intermediate in price between gold and silver, but indispensable in the chemical arts on account of its resistance to heat and acids, which renders it the best material for making crucibles and vessels required for certain purposes. It is obtained chiefly in the **Ural region** in Russia. (7) **Nickel**, sometimes used, among other purposes, for coining; formerly produced mainly in Germany, but now more abundantly in **New Caledonia**, and still more so in **Ontario**, where it is mined chiefly for American use. The metal is now finding greatly increased use in steel-making (396), as well as in plating. (8) **Cobalt**, in one of its forms found associated with nickel, and hence now also largely imported from **New Caledonia**. It is also now used like nickel to form a coating on other metals, but its principal use in the arts is in the form of the **oxide** (compound with oxygen), which is used as a blue colouring-matter for pottery and glass, and in that of **smalt**, which is finely ground glass coloured with this oxide, and is used in colouring paper, &c. (9) **Aluminium** is a metal valuable for its lightness, bright colour, its resistance to the action of the air even in the presence of moisture, and the excellence of its alloys. It is now sometimes used for the transmission of electrical currents, for which it has the advantage of giving nearly twice the carrying power of copper for a given weight of metal. Till lately the metal was made only by expensive processes from two compounds found in nature, and called bauxite, which is obtained from the south-east of France, Styria, Ireland (co. Antrim), the United States (Alabama, Georgia, and Arkansas) and elsewhere, and one called cryolite, obtained from the west coast of Greenland. Now an electric furnace is universally used as the means of extracting this metal, and both bauxite and cryolite are used in the process, the bauxite, however, furnishing all the raw material, while the cryolite (sometimes made artificially) merely serves in a molten state to dissolve the bauxite (hydrated alumina), which is then easily decomposed by the electric current. The cryolite is used over and over again. Very high temperatures being required, aluminium factories are usually erected where much water-power is available, as at Niagara Falls, Massena (near the Long Sault rapids of the St. Lawrence, in the state of New York), Rheinfelden in Switzerland, and elsewhere near the Rhine rapids, and at the Falls of Foyers in Inverness-shire. (10) **Sulphur**, used in making sulphuric acid (460), in vulcanising (320, 323), and also as a remedy for certain vine-diseases; exported as such chiefly from Sicily, and as a constituent of iron pyrites, chiefly from Spain and Portugal. Since 1903 sulphur has been produced in large quantity in Louisiana, U.S.A. (11) **Mineral Manures**. Among these the most important are:—(*a*) **Potash salts**, including **kainite**, produced chiefly at Stassfurt (582) in Germany, and exported either as found or after various kinds of treatment. (*b*) **Nitrate of soda**, a product of Chile, used both as a manure and in the arts (460). (*c*) **Phosphate of lime**, produced most abundantly in S. Carolina, Florida (at different places near the west coast) and central Tennessee, U.S.; also produced in the province of Liège, Belgium; in the form of **apatite** in Canada and Norway, and in an impure form in England (Cambridgeshire and one or two other counties); and in that of **phosphorite**, in Spain (Estremadura). (*d*) **Guano**, properly speaking an animal product, since it consists of the droppings of birds accumulated through ages in regions where there is little or no rain to wash away the deposits so formed. It is, however, worked as a mineral, and may be described as an earthy phosphate rock. Formerly it was obtained chiefly from islands on the west coast of Peru, but these deposits have been exhausted, and it is now chiefly derived from the west coast of Chile (930), and in smaller quantity from various islands on the west coast of Cape Colony, in the West Indies (Aves Islands, Sombrero, &c.), and in the Pacific (Malden, Fanning, and others). (*e*) **Basic slag**, or the refuse

of the basic process of steel-making (394), which contains from 30 to 35 per cent. of phosphate of lime, and when finely powdered can be used as manure without further treatment. (12) **Borax**, a compound of boracic acid and soda, found in many parts of the world with a very dry climate, such as Tibet, parts of China and Persia, the western strip of Peru, the states of California and Nevada in the United States, and also manufactured from boracic acid obtained by concentration from springs in the south of Tuscany. It has very varied uses in the arts. Among the most important are its employment in the making of enamel and glazes for pottery, and in the making of certain kinds of glass, the borax serving to some extent as a substitute for silica (450). (13) **Nitrate of potash.** See 737*a*. (14) **Graphite** or **plumbago**, popularly known as 'black lead,' a substance familiar from its domestic uses and its use in the making of lead pencils, but also very largely employed in making crucibles and type-metal, and for other purposes. Formerly the best kind was obtained from Borrowdale in Cumberland, but the island of Ceylon is now the chief source of supply (745: see also 700). In Germany it is produced at Passau in Bavaria, in the United States at Ticonderoga in the state of New York. (15) **Lithographic stone** is known to occur in various places, but the best stones are all obtained from the quarries of Solenhofen in the neighbourhood of Donauwörth in Bavaria. (16) **Grinding and polishing substances.** (*a*) **Buhrstones**, the stones used in the old kind of corn-mills, now to a large extent superseded by those in which steel rollers are employed in the manufacture of flour. The best specimens of this kind of stone are obtained in the Paris basin. (*b*) **Grindstones**, produced at Newcastle, at Wickersley (eight miles east of Sheffield), and elsewhere in England, at various places on the Bay of Fundy in the Canadian Dominion, and in Ohio and Michigan in the United States. (*c*) **Infusorial earth** or tripoli powder, a fine silicious earth used in polishing metals, glass, &c., and now also in the manufacture of dynamite, found not only in Tripoli, from which it takes one of its names, but more abundantly in Germany, on the Lüneburg Heath, between the Elbe and the Aller, and also in Scotland, France, Maryland (U.S.), and elsewhere. (17) **Gypsum**, produced in England chiefly in the counties of Nottingham and Derby. (18) **Clay.** The varieties of clay which have chief commercial value are china-clay and fire-clay. (*a*) **China-clay** is largely worked in the British Isles, in the east of Cornwall and the south-west of Devon. Besides being used in the making of porcelain (444) it is employed in the making of paper (435) and cotton size (259). (*b*) **Fire-clay**, used in making fire-resisting bricks, crucibles, &c., occurs in many places. In Great Britain the deposits chiefly worked are those found on or near coalfields (south Staffordshire, Glamorgan, Durham). (19) **Tungsten** or **Wolfram** has recently acquired greater importance from its being used in the production of high-speed steel (396), is mined in Cornwall, but more largely in the United States, Australia, and other countries. (20) **Asbestos**, which now has a great variety of uses—in gas-stoves, for the making of fire-proof curtains, as a packing for cylinders, and as a heat insulating covering for steam boilers and pipes, &c.—is derived mainly from Canada, Italy, and Russia, the Canadian supply coming from that part of upper Quebec which lies to the south of the St. Lawrence.

IV. Manufactured Articles in which various Materials are used.

424. LEATHER. Leather consists of the skins of animals prepared in various ways. Its manufacture has given rise to an extensive commerce in articles of different kinds: first, in the hides and skins which form the raw material; second, in the substances used in treating this raw material; and third, in the manufactured product—leather, and articles made from leather.

425. The **hides** used in the industry are derived from a great variety of animals. The great majority of the larger mammals whose skins are not of more value for furs contribute to it more or less. Even **aquatic species** add their share to the leather-makers' materials. From the skin of the **white whale, or beluga,** of the Arctic Seas is made a kind of leather which is sold under the misleading name of porpoise-skin, and, being of great strength and very impervious to water, forms the best material for shooting-boots and some other purposes. The skin of the **manatee and dugong,** the two mammals which feed on aquatic plants in tropical and sub-tropical seas and rivers, is likewise used by the leather-maker. Even the skin of some animals outside the class of the mammals—for example, the **crocodile**—is likewise employed. But the animals which furnish by far the largest proportion of the hides of commerce are the domesticated species—the **horse, ox, sheep, goat,** and **pig**—which are kept in such large numbers wherever men are found above the lowest stage of barbarism. Formerly British India furnished the United Kingdom with its chief supplies of hides as well as large quantities of goat-skins, but now this trade is mainly replaced by imports of leather from that country, and though India is still an important source of raw hides the Argentine Republic and Italy supply as much or more. Goat-skins are largely obtained also from South Africa and other (chiefly Mediterranean) countries, while sheep-skins are naturally obtained in greatest numbers from the same counties as those from which we draw our wool—Australia, New Zealand, British South Africa, and the Argentine Republic. Hides are preserved for and during transport either by being steeped in brine, and are hence called wet, or by some process of drying. The raw hides from the East Indies and south Africa are mostly dry, those from America and Australasia wet.

426. Tanning is the principal process resorted to in converting hides into leather. It consists in saturating the hides, after some preliminary cleaning and dressing, with a solution which alters the chemical character of one of the constituents of the hide, and renders the hide firm and durable. Nearly always this solution is derived from some vegetable substance, the bark or some other portion of a

tree or other plant, which yields the necessary principle called tannin, or tannic acid, a very powerful astringent. Substances containing this principle have been discovered to exist in the native vegetation of almost all parts of the world, and the discovery of the art of making leather by means of them was very early made, and appears to have been made independently in many different regions. The processes of tanning are represented on the oldest Egyptian monuments, and the North American Indians knew how to make a pliant and excellent leather before the discovery of America by Europeans. Nevertheless the art is said to be still unknown throughout a large part of central Africa south of the Sudan.

427. About fifty years ago **oak-bark** was the agent almost exclusively employed in tanning in Great Britain; now it is only one out of fifty or more competitors, and there is a large import of various tanning-substances from many parts of the globe. Of these, however, there are only five or six imported in sufficient quantity to be separately enumerated in the British tables of trade. The headings under which they are entered are **bark, cutch and gambier, myrobalans, sumach,** and **valonia.** Under the heading bark are included not only different kinds of **oak-bark, larch-bark,** and others, which, besides being produced at home, are largely imported from the mainland of Europe, but also others imported from elsewhere. The bark imported from the United States is chiefly that of the **hemlock spruce,** the principal tanning agent both there and in Canada. In both countries, however, bark from native oaks (**343**) is used for the best leather. A still larger quantity of bark is imported from the Australian colonies. This is chiefly derived from various species of Acacia, the best being that of the *Acacia pycnantha*, Benth., or **black wattle,** as it is called in Australia—a bark that yields nearly a third of its weight of tannin. Under the name of **Natal bark,** large quantities of the bark of another species of acacia, *A. mollissima*, Willd., are now exported from Natal.

428. Cutch and gambier, though associated in the trade returns of the United Kingdom, are quite different products, but they are both extracts made by boiling and evaporating, and both obtained from the East Indies, though not from the same region. **Cutch, or catechu,** is extracted from the chopped wood of a kind of acacia (*Acacia catechu*, Willd.) abundant in the forests of India and Burma, and is more used in dyeing than in tanning. **Gambier** is extracted from the leaves of a shrub (*Uncaria Gambier*, Roxb.) belonging botanically to the Cinchona family (**311**), a native of the Malay Peninsula and the Eastern Archipelago, and is imported from Singapore. It is also used in dyeing, and in China is much used for chewing, along with betel-nut. Having the tannin concentrated by the process of extraction, one ton of gambier will go as far as six tons of oak-bark in tanning. Attempts are now being made to introduce the shrub into the West Indies.

429. Myrobalans are the principal of the numerous substances used

in India for tanning. They are the fruits chiefly of two species of trees of the genus Terminalia abundant in Indian forests. **Sumach** consists of the powdered leaves and young twigs chiefly of one species of shrub (*Rhus coriaria*, L.), and is imported from the Mediterranean, and above all from Sicily, where the best quality is cultivated. **Valonia** is the name given to the acorn-cups of a species of oak which grows in the Levant. It is imported mainly from Smyrna, and is used in dyeing as well as tanning. Of other vegetable substances used for tanning the best-known perhaps is **divi-divi**, which consists of the twisted pods of a leguminous tree known as *Cæsalpinia coriaria*, Willd., a native of South America. In recent years there has been a rapidly growing export from the Argentine Republic of extract of the wood of the quebracho (*Aspidosperma Quebracho*, Schlecht.), and of the wood itself, for the rapid tanning of cheap sole leather.

Cutch and gambier are at present the principal tanning-materials imported in the form of extracts; but the making of tannin extracts being easy, and their transport, of course, much less costly than the bulkier substances from which they are made, the preparation of such extracts for export from other sources is increasing.

430. Attempts to tan with mineral substances have been made for about a hundred years, and these attempts have at last been crowned with a certain measure of success, the best results having been attained by means of compounds of the metal chromium. Chrome-dressed kids are now a regular manufacture.

431. For certain purposes skins are made into leather without tanning. A soft flexible kind of leather suitable for gloves, &c., is made by a process called **tawing**, in which alum and other salts are the principal substances employed. **Wash-leather**, or chamois leather, is made by working oil into the cleaned skins.

432. Of tanned leathers that undergo a special treatment the most important kinds are Morocco and Russia leather. **Morocco leather** when genuine is made from goatskin, is always coloured on one side, and on that side has the well-known roughened surface imparted to it by means of a stamp, generally of boxwood. It takes its name from the country where it was first made,[1] and where it is still largely manufactured—a country which, like all other mountainous countries bordering on the Mediterranean, has a great abundance of goats. By the Moors it was introduced into Spain, where Cordova and other Moorish cities acquired celebrity in connection with this product, so that the name of **cordova leather or cordwain** came to be applied as a general term for Spanish goatskin leather. About the middle of the eighteenth century the manufacture was introduced into Alsace, and since then it has been carried to all other industrial countries, and it has consequently

[1] Or through which it was first introduced into Europe. According to some accounts what was first known as Morocco leather was really leather manufactured in Kano, in Sokoto.

declined in Spain, which for centuries supplied fancy leathers to all the rest of Europe.

433. Russia leather is distinguished by its peculiar odour, which has this advantage, that it is so disagreeable to insects that the presence of a few books bound in this leather in a book-case is said to be enough to preserve the other volumes from their attacks. The odour is due either to the leather being tanned with the bark of the Russian birch, or to its being treated with a kind of oil made from the bark or the bark and roots of that tree. This kind of leather is still a speciality of the Russian leather industry.

434. The European countries in which the **manufacture of articles** from leather is **most highly developed** are **Germany, France,** and the **United Kingdom.** In quantity of production and amount of export **Germany** stands first, which is a natural enough consequence of its central position in a populous continent, and the advanced state of its industrial organisation generally. The raw materials of the manufacture, like those of the paper industry, have to be collected from all quarters from among a dense population, and thus can be most abundantly and cheaply supplied to factories that are centrally situated. (See **440.**) **Coloured leathers** are the specialty for which Germany is chiefly noted in this branch of industry. **France** comes next to Germany in the extent of its leather manufacture, and it stands pre-eminent in the amount of its glove manufacture, even if not without a rival as regards quality in this department. It is also noted for its **lacquered or patent leather,** a product which was first made in that country about the middle of the eighteenth century. Both of these countries have an export of leather manufactures of more than twice the value of that of the United Kingdom, and an export against which there is to be set only a trifling import. In the case of the **United Kingdom** on the other hand, the value of the import of leather-manufactures equals or exceeds that of the exports, the most valuable item among the imports of this kind being gloves, chiefly from France, Belgium, and Holland, the latter no doubt largely of German origin. Of the British exports of leather-manufactures, the most important, next after boots and shoes, are saddlery and harness (made chiefly from pigskin), these being goods for which British leather-manufacturers have a high reputation. The **United States,** as is natural in the case of a country which has such a vast area devoted to the rearing of domestic animals to draw upon for the raw material,[1] has a very large industry in leather (**903**) and vast native supplies of tanning bark (**427**).

435. PAPER. Paper is made chiefly from vegetable fibre reduced in water to a pulp so fine that the particles of fibre can scarcely be felt. Nowadays a certain proportion of China clay (**444**) is often added to the

[1] Till late in the nineteenth century the imports of leather manufactures into the United States greatly exceeded the exports thence, but in 1900 the value of the exports was nearly twice that of the imports.

pulp, and, when not in excess, it improves the inferior qualities of paper. The pulp, after being **bleached by means of chloride of lime** (461), is ready for paper-making, and for this purpose is kept by constant stirring as nearly as possible of an equal consistency throughout. When the paper is made by hand, as some of the best kinds still are, a frame called a mould, consisting of a piece of fine wire gauze bordered by a raised rim, is introduced into the pulp by a workman, who with the aid of another light frame withdraws as much of the pulp as is necessary to make a sheet of paper. The water quickly drains through the wire gauze, leaving the vegetable fibres to form a thin moist film. This film when dried by various processes forms paper; not, however, paper that can be written on, but that soft porous kind which is used as **blotting- or filtering-paper.** To be made capable of receiving ink without allowing it to run it must be immersed in **size** (the essential ingredients in which are **rosin** and **alum**), and various other operations are necessary before writing- or printing-papers have the appearance and finish that belong to them when sold.

436. Machinery for paper-making was first used with success early in the eighteenth century. All such machines consist in contrivances for feeding a supply of paper-pulp equally to a revolving endless band or apron of fine wire gauze, and passing it thence to a similar apron of felt or flannel, and afterwards to pressing-rollers, &c. So perfect is the machinery used nowadays, that from pulp constantly supplied to the machine a **continuous roll of paper** of any length (sometimes miles long) can be delivered from it in a finished state, either entire or cut up into sheets. The printing of newspapers is now done to a very large extent on the uncut roll.

437. In the manufacturing countries of Europe and America the vegetable fibre for paper-making is very largely used in the form of **rags**, that being the form in which the most useful fibres for the purpose, linen and cotton, can be obtained cheapest. The **best** kinds of paper, at least in western countries, are still made from **linen rags**; but the supply of these is totally inadequate to meet the requirements of paper-makers, and hence not only cotton but also woollen rags are likewise employed, and vegetable fibres are now largely used in other forms. In particular, a kind of grass called **esparto** or **alfa**, which covers immense areas in the arid regions of southern Spain and northern Africa, from Tripoli westwards, is now imported into Great Britain for paper-making in much greater quantity than rags; but whereas linen or cotton rags yield about half their weight in paper, esparto yields only about one-sixth of its weight in that form. Of late years, esparto has been largely displaced as a paper-making material by **wood-pulp**, either in the form of mechanical wood-pulp, made by simply grinding down the wood-fibre chiefly of spruces, pines, and poplars, or in that of chemical wood-pulp made from the same woods by one or other of two different processes, in one of which soda is the chief agent, and in the

other sulphurous acid along with either lime or magnesia. The mechanical pulp is a very inferior sort, used only in making cheap papers. The making of wood-pulp is carried on only where there is abundance of the raw material along with water-power (Introduction to the Fourth Edition par. 18). Into the United Kingdom wood-pulp is imported chiefly from Norway and Sweden, and next to these from Canada.[1] The refuse of jute-manufactures likewise affords an important material for this industry, which can also utilise directly a whole host of vegetable fibres, some of which—for example, the **bast fibres of the baobab**—are of great value for special purposes, such as the making of paper **for bank-notes**. In **China and Japan**, where the paper-makers excel the best European workmen in the making of some very delicate but strong papers, the material chiefly used is the inner bark of a tree known as the paper mulberry (*Broussonetia papyrifera*, Vent.), the leaves of which can be used in feeding silkworms. The strength of this paper is due to the fact that in making the pulp the long bast-cells are not broken and torn as in European pulping-machines, but merely softened and separated by beating. In taking up the pulp in the mould the cells are made to lie in one direction, and the paper may be strengthened by taking one or more additional dips, in which the cells are made to lie in other directions. Gums are used to make the cells of the pulp adhere. Thick papers are made capable of being used for many of the purposes of leather. The Japanese also make a very strong kind of paper from **seaweed**.

438. When we consider the immense consumption of paper in forms with which every one is familiar, and the great variety of the purposes to which paper is now applied, we can realise to some extent the importance of this invention in the history of mankind. It has often been pointed out that, without some cheap material to make books of, the invention of printing would have been almost fruitless. The history of the art of paper-making is therefore of peculiar interest.[2]

439. The art does not seem to have been discovered independently in the West. From China it spread into central Asia, and **a paper-factory was established at Samarkand early in the eighth century, A.D.**, when that town was in the hands of the Arabs. By the Arabs it was introduced into Spain, and it is certain that linen rags had come to be used for the purpose before the close of the twelfth century. It was probably for this reason that a small district situated to the south of Valencia in Spain, which had been celebrated in Roman

[1] In 1901, the first year in which chemical and mechanical wood-pulps were distinguished in our returns, the value of the chemical wood-pulp imported was about twice—in 1909 more than twice—that of the mechanical.

[2] Parchment (359) and papyrus rolls were the ancient substitutes for paper. The latter were made by causing the thin inner skins found at the bottom of the stems of a kind of rush which grows in the Egyptian delta to adhere together at their edges. The process is obviously a laborious one, so that the roll could not but be costly, yet Egypt carried on a large and lucrative trade in this article, and vast thickets of papyrus grew where there are now fields of cotton, maize, rice, &c

times for its flax, was equally celebrated in the twelfth century for the excellence of its paper, which was exported thence both to the East and West. The art, if not first practised, was at least **first firmly established in England in 1588**, when a paper-mill was erected at Dartford in Kent, which county has always been noted for its excellence in this branch of industry. Into Scotland, where it is chiefly carried on in the counties of Mid and East Lothian, it was not introduced till near the close of the seventeenth century. Everywhere this industry is carried on, as might be expected, by the side of clear streams, which supply the water required for making and washing the pulp.

440. Among European countries, the **United Kingdom** and **Germany** are the two rivals in the **consumption** of paper relatively to population, both of these countries being estimated to use upwards of **13 lbs. of paper per head** in a year; whereas France, which comes next in this respect, is estimated to consume less than 10 lbs. **The production of paper in Germany**, however, **greatly excels that of the United Kingdom**—excels it in a much higher ratio than the population of Germany exceeds that of the British Isles. This superiority in the amount of the production in Germany is, no doubt, due to the greater abundance of the raw material, Germany lying in the centre of a populous continent from which rags may be collected without any break in the mode of carriage. Germany supplies the largest share of imported rags for paper-making in Great Britain, and for its own paper industry makes use of little esparto, its abundant supplies of rags, and now also of wood-pulp both of native and foreign origin, enabling the paper-makers to dispense with the other material. The mode of using esparto as a paper-making material was patented by Mr. Routledge in 1856, and in course of time it came to be the chief material used for that purpose in this country, but here also it has latterly been to a large extent displaced by wood-pulp. About 1885 rags made up only about 20 per cent. in value of the British import of paper-making material.[1]

441. The large production of paper in **Germany** leads to a large export of paper and paper manufactures from that country. All other leading countries belonging to the mainland of Europe, except Russia and Spain, export, like Germany, more paper than they import; and the fact that Spain, which exports so much of the raw material for this manufacture, and a raw material so bulky in proportion to the manufactured article made from it, should be an exception in this respect, is a striking indication of the backward state of industry and the room for development in that country. The British imports of paper and paper manufactures greatly exceed the exports, and this disproportion tends to become greater. The excess on the side of

[1] In 1909 about 4 per cent., esparto and other fibres 16 per cent., other materials 2 per cent., wood-pulp 78 per cent.

imports is much greater in quantity than in value, the **British exports** being mainly **of high quality**—writing and printing papers, and paper-hangings, for all of which this country has long been justly noted.

442. In the **consumption of paper** relatively to population the **United States** are ahead even of Great Britain and Germany, which is no doubt chiefly due to the wide circulation of newspapers in that country, and hence speaks volumes not only for the advanced state of popular education, but also for the general diffusion of ordinary comforts among the people. To meet this large consumption there is not only an extensive native industry, supported to a large extent (as might be expected) by the importation of foreign rags, but also a large import of manufactured paper, notwithstanding the existence of a customs duty upon this commodity.

443. Paper manufactories on the European model have been erected in the principal countries of eastern Asia, and in India those set up in the neighbourhood of Calcutta and Bombay have already almost extinguished the hand-made paper, strong though coarse, once largely made by the Mohammedans of that country. Of the factories of this kind in Japan one, at Tokyo, is a government establishment, and the vellum paper exhibited at the Sydney International Exhibition of 1879 by that establishment was pronounced to be of wonderful strength and texture, and the best and most remarkable exhibit of paper manufacture that had come under the notice of the judges.

444. EARTHENWARE AND PORCELAIN. The simplest form of manufactured article made from earth, or rather from clay, is a brick dried in the sun, and we may be sure that this is one of the earliest of human inventions. **Bricks** of this kind are still made in Egypt and other parts of the Old World where fuel is scarce and sun-heat by day quite or nearly constant, and also in those parts of the New World which have a similar climate, being known in the latter regions, which were formerly to a large extent under Spanish rule, by the Spanish name of **adobes.** It was but a small step to the burning of bricks by artificial heat. The **potter's wheel,** by means of which mere steadiness of hand enables a workman to mould moist clay into a perfectly round form, is likewise an invention of great simplicity and great antiquity. The method of glazing pottery is a less obvious discovery, and must have been due, like a host of other inventions, to some fortunate accident. The **oldest** specimens of **earthenware** that have come down to us are **unglazed.** Yet the art of **glazing** was **known to the ancient Assyrians,** Egyptians, and Etruscans, all of whom are noted among the nations of antiquity for their productions in pottery. Improvements in the potter's art were made by the Arabs during the period of their highest civilisation. By them the making of painted earthenware with a finely glazed or enamelled surface seems to have been practised before it was known to any European people. But the finest of all kinds of earthenware, the

kind known as **porcelain**, was originally a Chinese invention, referred by **Chinese** chroniclers to the time of a dynasty which reigned in China from the second century B.C. to the first A.D. **In Europe**, however, this earthenware **was unknown till the thirteenth century**, and does not seem to have become widely known till it was introduced by the Portuguese about 1500, which accounts for the fact that the name of porcelain (together with its equivalents in other European languages) is one of Portuguese origin. It was two hundred years later still before the art of making porcelain became known **in Europe**, where it was discovered independently. An inferior kind of porcelain was made at St. Cloud in 1695, but the true or **hard porcelain**, as it is called, was **first made about 1709 by a German alchemist** of the name of Böttcher, who discovered it to be the product of a mixture of sand with **kaolin or china clay (423·18)**, a fine kind of clay resulting from the wearing away of granite rocks under the action of the weather. Immediately after this discovery a porcelain factory was set up at **Meissen** in Saxony, where it is continued to the present day. Efforts were made to keep the art secret, but it gradually spread to other countries, and is now carried on in all countries which have a highly developed manufacturing industry.

445. For the manufacture of ordinary pottery many kinds of clay will suffice provided that they are free from iron, which causes the clay to fuse during the process of baking. Other ingredients are also used, such as burnt and powdered flint and phosphate of lime, the latter often in the form of bone-ash (356). The decorations on ordinary **pottery** are painted on the unglazed ware, and are afterwards protected by a **glaze** composed of various ingredients fused together by a second baking. The **glaze on porcelain** is merely a thin coating of glass, and the painting is added on the glaze by means of pigments composed of finely powdered coloured glass, after which the articles in this case also are again put into a kiln to be fired. An unglazed kind of earthenware under the name of **terra cotta** is moulded into statuary and other kinds of ornamental articles, and unglazed pottery is extensively used in the south of Europe, in Africa, and Asia.

446. In England the manufacture of earthenware remained in a backward condition till after the middle of the eighteenth century. Its chief seat was **Burslem**, in north Staffordshire, a place well suited for this branch of manufacture on account of the great variety of clays found round about it, as well as the abundance of coal in the vicinity. It is important that among the clays of this district ('the Potteries') is a great abundance of the coarse clay used in making the saggers or seggars in which the earthenware is baked. The presence of these two heavy materials, coal and coarse clay, accounts for the fact that this still continues to be the centre of the English manufacture of earthenware and porcelain, now that this branch of industry has attained greater dimensions in England than in any other country in

the western world, and clays, flints, and other raw materials have to be brought to the district from more or less distant parts. The finer kinds of kaolin for the manufacture are obtained (in the British Isles) solely in Cornwall and Devon, but are worked up into porcelain in Staffordshire, because it is cheaper to send kaolin to the Potteries, where there is abundance of coal and most of the other materials required for the purpose, than to bring the coal and other materials to the districts that furnish the kaolin.

447. The first great improvements in English pottery were due to **Wedgwood**, who was born at Burslem in 1730, and since his day the art has been brought in this country to such perfection that the English wares of this kind are unsurpassed if not unrivalled by those of any other part of the world. Besides the products of the Potteries, in the local sense of that word, England is noted for its ornamental stoneware (the hardest and heaviest kind of earthenware) made chiefly in London (Lambeth).[1]

448. Next to the United Kingdom Germany has the largest industry of this kind as well as the largest export, and France comes third. Formerly **Meissen** (588), in Saxony, and **Sèvres**, near Paris, vied with one another in producing the most beautiful coloured porcelains known, but English porcelain now has a place in the first rank.

449. In the East, **China** is still noted for its **porcelain**, which it exports to a considerable amount (chiefly from Amoy); and so likewise is **Japan**, into which the art was introduced from China.

It may be noted in conclusion that hardly any other branch of industry has so many names relating to the geography and history of the art in general use in connection with it. In English porcelain is very commonly known by the appropriate name of **china-ware**, and kaolin as **china clay**. The name of **majolica** was given by the Italians to painted and enamelled earthenware which they appear first to have become acquainted with as a product of the island of Majorca, and from the Italian has been adopted into English. **Faience** is a name for the same kind of ware derived from the Italian town of Faenza, where it was first made in Italy. **Delft** is the name of another kind of painted and enamelled ware first made at the town of that name in Holland, and painted blocks of this kind of ware are generally known as **Dutch tiles**.

450. GLASS. Glass is a substance made by melting together various ingredients, of which **silica** is always the chief, and is the

[1] About 1885 the United Kingdom exported earthenware and porcelain to the value of three or four times the value of its import, the exports being sent chiefly to the United States, the Australasian Colonies, and British North America. At the beginning of the twentieth century the value of the British export was only about twice that of the import, a change chiefly due to the growth of the imports. Our chief foreign markets are still as they were in 1885, but there is a great contraction in that of the United States, where the home industry is rapidly developing under the protection of duties varying from 20 per cent. to 60 per cent. *ad valorem.*

only one that enters into the composition of all kinds of glass. Silica is one of the most widely diffused substances in nature, and is found in various forms, quartz and flint being the most familiar of those in which it is met with in a compact state. In thin pieces of either of these minerals the somewhat glassy appearance is at once apparent. A still commoner form of silica is sand or sandstone, both of which are originally deposits of the sea, or of rivers or lakes. Most commonly they are both impure, discoloured, it may be, by iron, or mixed with lime or other ingredients; but sometimes they consist of nothing but silica, and such **pure sand or sandstones** afford the best material for glass-making, the sandstones being first ground into sand. **In England** various deposits of sand, at **Lynn** in Norfolk, at **Alum Bay** in the Isle of Wight, at **Hastings**, and **Leighton Buzzard**, have in turn been noted for the excellence of the material which they afforded for glass-making. **In France** the most famous deposits employed for the purpose are the sandstones of **Fontainebleau**, but at the present day the **United States** claim to possess, in the **west of Massachusetts** and elsewhere, the finest of all glass-sands.

451. Along with silica there is always fused in the making of glass some alkaline substance, either **soda** or **potash.** Glass made solely from soda is found in course of time to be perishable, and hence, in the making of most kinds of modern glass, **lime** is added to render the glass more lasting. Soda is chiefly used in the form of carbonate of soda and sulphate of soda, which are largely manufactured for the purpose (**457–58**); but for making some of the commoner sorts of glass, as bottle-glass, **common salt** is sometimes employed. Potash (**459**) is generally used in the form of carbonate of potash (the pearl-ash of commerce), sometimes in that of nitrate of potash or saltpetre (**737*a***). The glass made from potash is the freest from any tinge of colour, but that made from carbonate of soda, besides being nearly colourless when the other ingredients are pure, is easier to work in the state of partial fusion in which glass is usually treated. For ordinary purposes, accordingly, this substance is preferred. Potash is used either with or without lime in the manufacture of some of the best kinds of glass, such as **Bohemian glass** and **English flint glass** (crystal). In making this last kind of glass, **lead** (generally in the form of red lead—**415**) is used instead of lime, rendering the glass softer and more fusible and lustrous. The use of lead is an English invention of the eighteenth century. Besides these ingredients various others are used for special purposes, as to remove colours [1] which some impurities in the materials employed in making the glass might impart, or to give the colours desired to coloured glass. In the making of **bottle-glass**, the colour of which is an unimportant consideration, a great variety of ingredients are employed. In Germany some kinds of rock, such as **basalts**,

[1] For this purpose manganese is chiefly used, but when in excess this substance itself imparts an amethyst hue to the glass.

trachytes, granites, &c., which contain a certain quantity of soda and potash along with from 65 to 75 per cent. of silica, and are easily fusible, have been employed with success in glass-making.

452. In the process of manufacture glass, after the fusion of the materials, is worked at a high temperature, which maintains it in a soft and somewhat pasty condition, and it is frequently re-heated. The implement chiefly used in the manufacture is the **blow-pipe**, by means of which balls of the glass paste are blown out into hollow forms. To make bottles and similar articles, almost all that is necessary is to blow the glass in moulds of the proper shape. When flat sheets are required, there are two ways of making it from blown glass. By one method the hollow ball after being blown out is transferred to the end of an iron rod, and an opening being made opposite the end of this rod the piece of glass is twirled round and round continuously, and gradually made to open out into a flat sheet, with a thick lump in the middle (the bull's-eye). The glass so made is what is known as **crown-glass.** By another method, now more largely used, a long cylinder is made by blowing and twirling the blow-pipe, and the cylinder being cut open by a straight line is made to open itself out and fall flat on a table. Only the best kind of glass, made from the most carefully selected materials, is capable of being rolled out into sheets by means of steel rollers. Glass so made is called **plate-glass. Flint-glass** is the kind best adapted for being cut and engraved in the cold state.

453. All kinds of glass before being ready for use have to be annealed, or to undergo some equivalent process for enabling them to stand ordinary usage at ordinary temperatures. If suddenly removed from the temperature of the glass-works into the open air, they would be so fragile as to break at the slightest shock. The process of **annealing** consists in cooling them slowly and equally, so that no difference of strain in different parts of the glass is brought about by differences of temperature. Since 1875 different processes of making **hardened or toughened glass** have been tried, and hard cast glass has been made in forms suitable for railway sleepers, tramway rails, grindstones, and floor-plates, the glass so treated being run into moulds made of a mixture which becomes heated and conducts heat at the same rate as glass. By using potash or soda in excess, a kind of glass can be made which is soluble in water, and this **soluble glass**, as it is called, is used for various purposes, among others as a protective coating against the action of the weather on calcareous building stones.

454. The invention of glass took place in prehistoric times. It was known at a very early period in **Egypt**, but the oldest piece of transparent white glass of which the date is known is a vase found among the ruins of **Nineveh** and now preserved in the British Museum. It has inscribed upon it the name of Sargon, an Assyrian king who reigned about the close of the eighth century B.C. In ancient times

the Egyptians and Phœnicians were the two peoples most noted for their glass-making, for which both Egypt and **Phœnicia** supplied excellent sand, the former near Alexandria, the latter in the bed of the small river Belus (now the Naman), which enters the sea near Acre. The alkali in Egypt was obtained from the Natron (soda) Lakes situated to the west of the delta. In **Italy** the making of glass does not seem to have been practised till about the beginning of the Christian Era, and there is no positive evidence of window-glass having been used there before the third century A.D. In modern times the **Venetians** first acquired celebrity for the beauty of their glass manufactures, the art having been practised there in some form or other from a date not long subsequent to the foundation of the city. Glass-making is now pursued on or near all the most productive coalfields. **Belgium**, which has local supplies of sand as well as coal, and manufactures soda compounds from imported materials (**457**), is the headquarters of window-glass manufacture in Europe, and also makes excellent mirror-glass. (See also **519**, **620**, and above all **898**.)

455. SOAP. Soap as a commercial product is a chemical compound resulting from the action of **soda** or **potash** on various fatty or oily substances, and hence, besides being an important commodity (unknown to the ancients) in its manufactured state, is the cause of a large trade in the various fats and oils that enter into its composition, as well as in the alkalies mentioned. **Hard soaps** are those made with soda; **soft**, those made with potash. In the making of **common yellow** soap a large quantity of **rosin** (**334*a***) is added, and in the making of **transparent soaps spirit** is used. **Glycerine** is a bye-product of the soap manufacture. The fatty substances principally used in the manufacture of soap in the **United Kingdom** are **tallow**, **coco-nut** oil, **palm** (including palm kernel) oil, and **cotton-seed oil**; but in the **south of Europe** the staple ingredient of this nature is **olive oil**, along with which are now used, in addition to the vegetable oils just mentioned, **ground-nut oil**, **oil of sesame**, and a great number of others (**325**). Even the grease from sheep's wool (**205**) can now be employed in this industry.

456. CHEMICAL INDUSTRIES.[1] Of these only the most important can here be noticed, and only so far as to explain the large consumption of certain commodities. Details as to processes must be sought for in works on chemistry.

457. The commodities entered in the 'British Statements of Trade' under the head of **alkali** represent perhaps the largest of all such industries—namely, those concerned with the preparation of **carbonate of soda** and **caustic soda**, which are chiefly used in the manufacture of glass (**451**) and soap (**455**). As usually made in Great Britain by the process known as the **Leblanc process** (patented in France in 1794),

[1] See Introduction to the Fourth Edition, par. 22.

the materials employed are common salt, carbonate of lime (generally in the form of limestone), coal, and sulphuric acid. Common salt is in chemical language chloride of sodium—that is, a compound of the metal sodium with chlorine, which when free is a gas; and in order to be converted into carbonate of soda, the sodium, or rather the oxide of sodium, has to be brought into combination with carbonic acid. This union is effected by different stages. First, sulphuric acid is made to act on the common salt, by means of which sulphate of soda or salt cake and hydrochloric acid are obtained, the latter passing off as a gas. Next, the sulphate of soda is converted into carbonate of soda, and in this stage the burning of coal and carbonate of lime is necessary to furnish the carbonic acid. The product obtained is an impure carbonate of soda which is known as black ash and is sufficiently good for use in soap-making; but for the making of glass and some other purposes the carbonate of soda has to be purified. In the process of soap-making black ash is converted into caustic soda (a compound containing no carbonic acid) by treatment with quicklime.

458. This process or series of processes is now to a large extent superseded by another, called the **Solvay process**, in which common salt is converted into carbonate of soda by means of the carbonate of ammonium. A solution of ammonia is mixed with the salt, and carbonic acid then passed in as a gas. A further process enables the ammonia to be recovered and used over again. This method of making carbonate of soda is simpler than the first, and yields a soda highly valued by glass-makers for its purity. It has been very largely practised in Germany, to the injury of the older alkali manufacture of the United Kingdom.[1]

459. Potash, another of the alkalies largely used in the manufacture of glass and soap, is mostly made by the burning of vegetable matter, and the chief exporting countries are Canada, Russia, and other timber-producing countries. In France it has long been made from the grease of wool, which is in general a waste product. (See, however, **455**.)

460. Sulphuric acid, which is employed in a great many industrial operations, but most largely in the manufacture of soda as above described, is chiefly made on a commercial scale from nitrate of soda (**930**), and sulphur or iron pyrites, which is a compound of iron (often with more or less copper) and sulphur. The sulphur or iron pyrites is burned, and the resulting vapour acted upon (in leaden chambers) by nitric acid vapours obtained from the nitrate of soda, which is heated along with a quantity of the very acid (sulphuric) which the subsequent operations are intended to produce. Arrangements are made for recovering the nitric acid so that it can be used over again with little

[1] The export of alkali from the United Kingdom reached its maximum down to 1900 inclusive in 1883, when it amounted to 347,350 tons. In 1900, the last year for which the quantity of this export is recorded, the total amount exported was 183,000 tons.

waste. Nitrate of potash (saltpetre) may be used instead of nitrate of soda, cheapness being the ground of preference.

461. The hydrochloric acid obtained in the first stage of the manufacture of carbonate of soda by the Leblanc process (457) is utilised in the manufacture of **bleaching powder**, which is a compound of chlorine and lime. Manganese, in the form of the black oxide of manganese, is employed to free the chlorine from the hydrochloric acid, and the chlorine is then passed into chambers containing powdered slaked lime. Arrangements are made for recovering the manganese used in this process so as to use it again.

462. Sulphate of ammonia, a valuable nitrogenous manure, is one of the bye-products of the destructive distillation of coal in gas-making.[1] Another important bye-product of the same industry is **coal-tar**, which was at one time applied only to the same purposes as wood-tar, preserving ropes, timber, &c., but is now used to an enormous extent in the making of **dyes** of almost every hue. The first dye made from a substance extracted from coal-tar was a violet shade to which the name of mauve was given. It was accidentally discovered in 1856 by Dr. W. H. Perkin, in the course of an investigation made with a different purpose, and was at once applied industrially in the celebrated dye-works of Messrs. Pullar at Perth. Soon other shades of a similar origin were discovered, and now almost all shades can be imparted to fabrics by means of dyes extracted from one or other of the products of coal-tar. At first this branch of industry was mainly carried on in Great Britain, the land of its birth, and the country most abundantly supplied with the raw material; but it is a noteworthy fact that in recent years the chief seat of the industry has been transferred to Germany.[2]

463. Alum, which is largely used in the sizing of paper, dyeing, calico-printing, painting and the preparation of colours, the tawing of leather and other industries, is prepared by several processes from clay or slate.

464. Since 1892 an important industry has sprung up by the discovery in that year (almost simultaneously by Wilson in America and Moisan in France) that the **carbide of calcium** is formed when lime and carbon are fused together at the temperature of the electric furnace (Introd. to the Fourth Edition, par. 13). It then became possible to manufacture cheaply the powerful illuminant acetylene gas, a compound of carbon and hydrogen which is formed by the action of water on calcium carbide. The carbon is mixed with the lime in the form of coke of the utmost attainable purity. The manufacture is largely

[1] Works for what is called the direct manufacture of sulphate of ammonia from peat have been erected at Carnlough in the north-east of co. Antrim, Ireland.

[2] About 1885 it was estimated that Germany produced on an average about six times the quantity of dyes from coal-tar produced in the United Kingdom; and what is still more striking, Germany derives from Great Britain a large proportion of the aniline and benzene, the two principal coal-tar products required as raw materials for the production of these dyes.

carried on in Norway and in other parts where extensive water-power is available.

464a. Another important chemical industry of recent years is the manufacture of **artificial silks**. These, like the silk of the silk-worm, are made from some form of wood-fibre or cellulose. At one time sawdust was employed, but now cotton-waste is the material more generally used. By different processes a jelly is produced similar to the substance in the body of the silk caterpillar (**220**), and this by equable air-pressure is forced through glass tubes with orifices so minute that, just as in the reeling of silk, from ten to twenty of the fine filaments thus formed are united to form a single thread of silk. The first establishment for the carrying on of this industry was erected at Besançon near the forests of the Jura. Others now exist in Germany and Switzerland, and perhaps elsewhere.

465. MINOR MANUFACTURED ARTICLES AND MISCELLANEOUS PRODUCTS OF HUMAN INDUSTRY. Under this heading are mentioned those articles of human handiwork in the widest sense of that term which are of sufficient importance to be enumerated separately in the 'Annual Statements of British Trade,' but which are not noticed in previous paragraphs. A few others are added which are of more importance in the trade of other countries than our own. Those articles which in recent years have reached an average value of one million sterling in the import or export trade of Great Britain are printed in black type, an I or an E being added in parenthesis after the name of the article to indicate whether it is the import or export that attains that value. Other articles are named in italics, and an I or E after the names of these indicates whether the import or export is in excess. Where neither letter is added there is no great excess on either side. The principal origin of imports or destination of exports is sometimes given, along with one or two other particulars of interest, but with regard to the products of British industry generally it is enough to say that most of them are very widely scattered among foreign countries and British possessions.

466. *Arms* and **Ammunition** (E.), the manufacture of which is chiefly centred in this country at Birmingham and Newcastle. *Bags*, empty (E.): the export of this article has greatly declined of late years, chiefly in consequence of the development of the jute industry in India (**315, 738**). **Beer** (E.): Beer is chiefly made from barley, and especially malted barley (**163**); but almost any kind of grain is capable of being used for the purpose, and hops (**188**) are employed to impart a bitter flavour. Among the imported beers specially named in the 'Annual Statements' are mum, which is made from wheat malt; and spruce beer, made from the leaves of the spruce fir. Saki, a kind of beer, made from rice, is an important article of local trade in Japan. *Biscuits and Bread* (E.). *Bleaching Materials*: see **461**. **Books** (E.), principally sent to Australia and the United States. Germany is the only country whose export of books rivals in value that of the United Kingdom. *Buttons and Studs not of metal* (I.). *Candles*: see **325, 331, 358b** and **358c**; **361, 408, 408a**. *Cement* (E.) The export under this heading is mainly hydraulic cement, so called because it hardens under water. It is made from lime, sand, and certain clays burnt. Two kinds differing in colour are distinguished in commerce, Portland cement and Roman cement, the former owing its name to its resemblance to a kind of limestone quarried, among other places, on the Isle of Portland in the county of Dorset. *Clay, Miscellaneous Manufactures of*. *Clocks* and **Watches** (I.), chiefly from France (to a large extent of Swiss origin—**601, 606**), Belgium, and the United States. *Confectionery*. Under this head the export is

more than six times the value of the import, but this was not ascertained before 1900, the exports of confectionery having been previously to that year included under pickles. *Cordage, twine, &c.* There is a considerable import from the British East Indies; no doubt in consequence of the large use made of Manilla hemp (317), coco-nut fibre (319), and other tropical materials in this branch of manufacture. *Embroidery* and *needlework* (I.), chiefly from Belgium, no doubt of Swiss origin (606): the exports under this heading are included under haberdashery and millinery. **Farinaceous substances and manufactures thereof** (I.), chiefly from Germany and the British East Indies. *Fire-crackers*, a considerable export from China.

466*a*. *Plaited goods* made from various materials form more or less important articles of commerce in several countries. *Baskets*, made chiefly from the twigs of various species of willow, are a speciality of German manufacture. *Wicker-work* of many kinds is made from *rattans*, the stems of various species of Calamus, belonging to tropical Asia, whence they are imported, chiefly by way of Singapore. *Straw hats* and various other straw-plaited goods are a considerable export from Italy, and especially Tuscany, where that industry has existed since the sixteenth century. Spring wheat straw is used for the purpose, the wheat being sown thickly so as to grow long and slender stalks. In **Belgium** straw for plaiting is largely grown in particular districts with a soil very rich in lime, which imparts to the straw great suppleness, strength, and whiteness (comp. 555). In **England**, Luton in Bedfordshire is the principal centre of straw-plaiting. It is also a leading industry in **China** and **Japan**, where plaited straw is made up into straw-braid for trimmings and exported in that form. In **Spain** plaited goods are made in large quantity from **esparto** (199, 437), and **Panama hats**, remarkable for their lightness, durability, and elasticity, are made from the midrib of the leaves of a kind of screw-pine (*Carlodovica palmata*, Ruiz et Pavon), a native of the tropical forests of South America, whence they are largely exported to the West Indies, and even in some years in considerable number to Europe.

Flowers, Artificial (I.), mainly from France. *Furniture* (E.). *Hats* or *Bonnets* (E.). **Implements and tools** (E.), the export under this heading consisting to a large extent of agricultural implements. **Lace and articles thereof** (I.): there has been a large increase in this import since 1880, in consequence of improvements in machinery on the mainland of Europe. *Lacquered wares*, an important export from Japan (787). *Lucifer matches and vestas* (E.): the British export of this commodity is exceeded by that of Sweden, the vast forests of which supply abundance of raw material; for the same reason there is a large export from Norway; China appears to have the largest import of this article (see also 792). *Mats and matting*, a considerable export from China, where rush or reed mats are a speciality. **Medicines** (E.). **Musical instruments** (I.), chiefly from Germany, Holland, and France. **Painters' Colours** (E.): there is also a large import, chiefly from Germany, Holland, and Belgium. *Perfumery* (E.). *Pickles, &c.* (E.). *Pictures and drawings* by hand (I.), chiefly from France. *Plants, shrubs, trees and flowers, roots* (I.), chiefly from Holland. *Plate*, gold and silver: the foreign trade of trifling value. *Saddlery* and *harness*: see under **LEATHER** (434). Ships: see the Appendix. **Spirits** (I.) The total import of spirits into the United Kingdom varies in value between two and three millions sterling, against which there is an export of about the same value. The place of origin of the imported spirit is different according to the nature of the spirit. All spirits are obtained by distillation from liquors previously fermented, or, in other words, which have been made to yield alcohol, and it is the alcohol more or less pure that is separated by distillation, and forms the principal ingredient of the spirit. To furnish the fermented liquor, any substance from which sugar is obtainable can be used, and hence all kinds of grain and farinaceous substances like potatoes, as well

as grapes and other fruits, can be employed for the purpose, the flavour differing somewhat according to the substance used in fermenting, and often being modified by the addition of other substances. The principal spirit imported into the United Kingdom is **brandy**, which is, properly speaking, the spirit distilled from wine, but is now made very largely from other liquors, a certain flavour being added by means of the lees of wine, dried fruits, &c. This kind of spirit (so far as it is imported) is still derived almost entirely from France, the chief source of our wine supply; but the brandy made in France is now, since the ravages wrought in the French vineyards by the phylloxera (182), only to a small extent made from wine, most of the material for French spirits being obtained from molasses, beets, and potatoes. *Rum* is distilled from molasses and other juices of the sugar-cane or bye products of sugar-manufacture, and is hence mainly imported into this country from Guiana and the British West Indies. *Geneva* or *gin* is, properly speaking, a spirit distilled from grain and flavoured with juniper berries, and is chiefly imported from Holland. The true flavour is often imitated by means of oil of turpentine. Of the spirits not separately enumerated among the British imports the largest quantity comes from Germany, where potatoes are the raw material chiefly employed. The spirit of British manufacture chiefly exported from the United Kingdom is *whisky*, which is made for the most part in Scotland and Ireland from various kinds of grain, but chiefly from barley malt. Of the kinds of spirit which do not enter to any great extent, if they enter at all, into British trade, the chief are *arrack* or *raki*, and *slibovits*, or *slivovitsa*. The former is made from rice, and is a considerable article of export from the British and Dutch East Indies, the latter from plums, and is chiefly manufactured in the south-east of Europe: in Roumania, Servia, and other countries adjoining the Lower Danube. The countries in which ardent spirits are most largely consumed are chiefly northern countries with a rather severe climate. In Russia the average annual consumption of spirits per head is estimated at nearly two gallons; in Scandinavia and Denmark this rate is approached or exceeded; in Great Britain it has been in recent years about one gallon, notwithstanding the existence of a very high customs and excise duty on this commodity. Almost all Arctic travellers agree in stating that the natives of those regions are willing to do almost anything for a glass of spirits.

466*b*. Stationery not paper (E.). *Tartar* or *argol* is a bye-product of the wine-manufacture, being deposited on wine casks in the form of a hard crust. It is used chiefly for the manufacture of *tartaric acid*, which, besides being employed in the making of various effervescing drinks and for domestic purposes, is largely used in calico-printing as a means of preventing certain parts of the fabric from retaining coloured impressions. Tartar, the raw material, is chiefly exported from the wine-producing countries, but tartaric acid is most largely manufactured in Great Britain, the United States, and Germany. **Telegraph wires and apparatus** (E.), an export of very variable amount. **Toys** (I.), chiefly from Germany and Holland. *Umbrellas and parasols* (E.). *Yeast*, a bye-product of beer-brewing, used to promote all kinds of fermentation and in baking, imported in the dry form under the name of German yeast.

EUROPE

467. Europe, the smallest of the continents, is, taken as a whole, the most densely peopled. In considering this superior **density of population** we must take into account the size of the continent, its situation and outline, and its history.

468. The difference in the **size** of Europe as compared with Asia makes it impossible for it to have such vast tracts as the latter continent, remote from the sources of moisture, the essential condition of fertility and cultivation, or rendered unfit for cultivation by the duration and the rigour of frost. The situation and outline of the continent are peculiarly favourable to its **climate**. The whole area, except a small fraction in the north, lies within the temperate zone, and the great irregularity of its outline causes it to enjoy in a higher degree than any other continent the mitigating effects of the sea on extremes of heat and cold (35, 35*a*). Its **westerly situation** is of even greater importance in this respect (36), and its **southern peninsulas** have a peculiarly warm and equable climate, not only in consequence of the moderating effect of the Mediterranean Sea on the temperature, but also because these peninsulas are to a large extent protected from cold northerly winds by mountain-barriers on the north (38).

469. In temperate Europe there is the same increase in extremes of temperature from west to east as in other parts of the north temperate zone, and this is true to a certain extent even of the countries belonging to the Mediterranean region (684). Besides these peninsulas, or the greater part of them, nearly the whole of France and the British Isles, and the whole of Belgium and Holland, are outside of the area in which the **mean daily temperature** sinks below the freezing-point for at least one month in the year. On the other hand, the area in which the mean daily temperature is above 50° Fahr. for at least eight months in the year is almost confined to the Mediterranean region, although it includes also the west of France from about the Loire southwards. In the east of Russia the area in which there is at least one month with a mean daily temperature above 68° Fahr. extends as far north as the latitude of the Orkney Islands.

470. By far the greater part of the area of Europe has a sufficient **rainfall** for cultivation, so that south of the region in which the temperature puts a limit on agriculture, almost the whole of the lowland

area, and even in the far south land at the height of between two and three thousand feet, is capable of being tilled. The deficiency of rainfall prevents the pursuit of agriculture chiefly in the south-east of Russia (628) and in the interior of Spain (657). But though the **rainfall** is thus generally distributed, and occurs everywhere more or less all the year round, it is **most abundant at different places during different seasons.** The west, and above all the north-west, is the region in which autumn rains prevail, the east that in which there is a predominance of summer rain, but the **Mediterranean peninsulas** are the only region in which there is a marked deficiency of rain during any particular season. There the rains are chiefly winter rains, and the middle of summer is remarkable for its drought, to the south of about 40° N. almost rainless (39*b*).

471. The great fact in the history of Europe which helps to explain the high density of population in that continent is the **long duration of its advancing civilisation,** together with the remarkably rapid strides taken within the last hundred years in consequence of the great **mechanical inventions** which have taken place in Europe. In civilisation, however, this continent was preceded by Asia and northern Africa (Egypt). In the earliest glimpses that we get of the commerce between western Asia and southern Europe we find the latter region supplying only the produce of their herds and forests—hides, wool, wood, wild honey, cattle and sheep, besides male and female slaves; and the articles received in return are ready-made clothes, iron and other metal tools, weapons, images, boxes of bronze and vessels of glass. The commerce thus carried on by Asia with Europe seems in fact to have been not unlike that carried on partly by Europeans, partly by Arabs, with the people of Africa at the present day.

472. Many of the cultivated **trees and plants** now thoroughly characteristic of certain parts of Europe are known or appear to have been **introduced** into that continent within historic times. The **olive,** the **cypress,** and the **laurel,** the evergreens now so characteristic of the Mediterranean peninsulas, and so well adapted to stand the dry summers of that region, seem all to be of Asiatic origin, though introduced at a very early date. The olive began to clothe the hills of Sicily as far back as the seventh century B.C. Of Oriental origin also is **lucerne,** the equally characteristic fodder-plant of that region, the deep-rooted ally of the clover which survives the driest summers (comp. 180) and has hence been introduced into many other parts of the world with a similar climate to the Mediterranean. From Asia also came the **fig, mulberry, almond, walnut, chestnut,** and **apricot,** all before the birth of Christ. The mulberry of the ancients, however, was the black mulberry, the sycamine of the Greeks, the white mulberry (220) being a much later arrival from the East. From Asia likewise came at various dates, mostly after the beginning of the Christian Era, **rice, cotton,** and several members of the **orange** genus (citrons, lemons, and

oranges proper); and after the discovery of America **agaves** and **cactuses**, **potatoes**, **maize**, and **tobacco** were added to the vegetation and agriculture of this continent.

472*a*. The **chief cereals** of Europe, however, seem all to have been cultivated there in prehistoric times. Wheat and barley, as well as two kinds of millet, are proved by remains found beside the Lake-dwellings of Switzerland to have been cultivated in the later Stone Age; but the evidence of language would appear to show that many of our common cultivated plants, including cabbages, peas, vetches, parsley, and onions, were introduced into cultivation in central and northern Europe directly or indirectly from Italy.

473. At the present day Europe is to a larger extent a manufacturing region than any other continent, but the **predominance of manufactures** is characteristic only of certain countries. As is shown by the tables in the Appendix, manufactured goods have a prominent place among the exports of native origin in the United Kingdom, France, Germany, Switzerland, and Belgium. In most other European countries the chief exports are still products of the soil, the forest, or the sea; but in the case of the Netherlands this cannot be definitely ascertained, owing to the manner in which the commercial statistics of that country are prepared. One of the most important facts in the commercial history of the continent within recent years is the extent to which its agriculture has been affected by the rapid development of commerce in grain with many parts of the world in which wheat and other crops are produced under exceptionally favourable conditions **(146–51).**

THE BRITISH ISLES

474. The British Isles lie in the north-west of Europe, between the parallels of 50° and 60° N. To be more precise, the fiftieth parallel of latitude runs a little to the north of Lizard Point in Cornwall and the Scilly Isles, and the sixtieth through the southern end of the mainland of Shetland.

475. Surface, England. Of the countries which make up the British Isles England is that which has the greatest proportion of the surface available for production or purposes subsidiary to production. According to the most recent agricultural returns, more than **three-fourths** of the entire area of land and water was **under crops or grass or lying fallow**, and when it is considered that about 4½ per cent. of the surface was occupied by woods, and that a large area is taken up by towns, factories, roads, and railways, it will be seen that the area occupied by unproductive hill and moorland is very small indeed.

476. The **hills and mountains** of England are chiefly in the north and west. The Cheviot Hills with their broad spurs, and the table-lands of the **Pennine Chain**, 'the backbone of England,' as it has been called, which runs from north to south from Cumberland into the heart of Derbyshire, cover a considerable extent of ground, and, though almost entirely productive, are fit, so far as agriculture is concerned, for little else than sheep-pastures, so that in these districts the population is even now very sparse, except where manufactures are carried on. Other extensive tracts with a poor soil for agriculture lie in the south-east, chiefly in the districts covered with chalk hills and downs—**Salisbury Plain** and the **Marlborough Downs** in Wiltshire, the **North and South Downs**, the **Chiltern Hills**, the **tableland of Northamptonshire**, and the **Yorkshire Wolds** in the East Riding. If England depended upon agriculture alone or mainly, the existence of these and other tracts would always tend to keep down the average density of its population.

477. But in view of the nature of the chief industries of the country, it is a matter of more importance that the high grounds of England interfere comparatively little with the **facilities for locomotion.** On all sides there flow down from the hills **navigable rivers** of greater or less length. In relation to internal communication the most important of these are the Ouse (Yorkshire), Trent, and Mersey, the Thames and

the Severn with their tributaries. The **Ouse** is navigable for barges throughout its length, and its most important tributaries are navigable likewise or have been canalised; and so little of a barrier to communication is presented by the Pennine Chain that three lines of canals have been laid across it, bringing into connection the ports of Goole and Hull on the east, and those of Liverpool and Preston on the west. By the valley of the **Aire** a canal, which has a branch to Bradford, ascends by way of Leeds and Skipton, crosses the watershed at a height of only 477 feet, and descends on the Lancashire side by way of Burnley and Blackburn to Preston. By that of the **Calder** another line of canals ascends by way of Wakefield and Halifax, to descend by Rochdale to Manchester, where the Irwell becomes navigable. The third canal forms a more direct communication between the opposite sides of the Pennine Chain, but rises to a greater altitude. It joins Manchester with the Calder Canal by way of Ashton and Huddersfield. Its summit is at the height of 656 feet, and the crossing even at this altitude was effected only by piercing the **Stanedge Tunnel**, more than three miles in length.

478. From these particulars it might be inferred as a matter of course that canals in the lower regions of England are even more numerous, which is in fact the case. The Trent, the Mersey, the Thames, and the Severn are all interconnected by inland waterways, natural or artificial. The **Trent** itself is navigable for small sea-going steamers as high as Gainsborough, the **Thames** for vessels of two hundred tons as high as Hampton, and the **Severn** for vessels drawing six feet as high as Stourport. The Berkeley Ship-canal, which connects Gloucester with the estuary of the 'sandy-bottomed Severn,' enables vessels drawing more than ten feet to ascend to that town, avoiding the windings and shallows of the river.

479. The canals of England are mainly works of the latter part of the eighteenth[1] and the early part of the nineteenth century, and at the period when they were made were of very high importance for the development of English industry and commerce. Since railways were introduced (92) their value has been considerably diminished; and as it is still frequently alleged that this is due to the fact of their mostly having come under railway control, this matter is discussed in the Introduction to the Fourth Edition (pars. 29–35). They are still not without importance for the carriage of minerals and other bulky commodities, but even in the carriage of coal they are unable to compete with railways except where the conditions are exceptionally favourable to this mode of transport.[2] In recent years one large ship-

[1] The first, the Bridgewater Canal, constructed under the direction of James Brindley, was completed in its eastern section (from the Duke of Bridgewater's coal-mines at Worsley to Manchester) about the end of 1761, but was not connected with the Mersey till 1776.

[2] How much coal is carried by canals and inland navigations in the British Isles cannot be stated, for the table under this head annually published in the

canal has been constructed (**507c**). Several projects for ship- or larger barge-canals were subsequently started (Bristol to the Severn, Sheffield to the Humber, the North Staffordshire potteries to the Mersey), but they have been mostly abandoned.[1] The railways and canals of the British Isles all belong to private companies, but are to some extent under the control of a commission appointed under an act passed in 1888. Among other provisions of this act is one prohibiting any railway company, director or officer of a railway company from using any of the company's funds, without express statutory authority, to acquire any interest in a canal.

480. What has been said regarding the construction of canals implies that in **railway construction** the obstacles presented by the physical features of the country were of still less consequence relatively to the much higher value of the new means of transit. In view of the distribution of population, the most serious hindrances to railway communication are those presented by the Pennine Chain in the region already referred to under the head of canals, and those on the routes connecting the more populous parts of England with the most populous part of Scotland. There are now railways on all the canal routes above mentioned. Further south Manchester and Sheffield are connected by a line passing through the **Woodhead tunnel**, which is only a few yards shorter than the Stanedge and attains an altitude of over 1,000 feet. On the northern routes the chief connection between Lancashire and the valley of the Eden is now, as it always has been, by way of **Shap Fell**, where the summit level of the rails is 916 feet above sea-level; that between the West Riding of Yorkshire and the same valley reaches between the head-waters of the Ribble and Lune a height of 1,250 feet. The next high crossings on the northern routes are all in Scotland. In Monmouthshire serious hindrances to communication are presented by the high ridges separating the populous coal-mining and iron-working valleys in the west, more than one railway having to climb to an altitude of more than 1,200 feet within a short distance, involving gradients up to 1 in 45. Obstructions to communication presented by water have been overcome by low-level tunnels at the mouths of the Severn and the Mersey, and under the Thames at several places in London. The **Severn tunnel**, below Chepstow, the longest in

statistics of mines and quarries is incomplete. From this table it would appear, for example, that no coal is carried by the Aire and Calder Navigation; yet the canal returns for 1898 (Cd.–19 of 1899) mention (p. 83) coal as the first and presumably the most important of the commodities carried by this navigation. This navigation was, in fact, the pioneer in providing exceptional facilities for the carriage of coal by means of barges provided with removable compartments, each containing thirty-five tons of coal, which may be tipped for shipment at Goole.

[1] The North Staffordshire scheme still engages attention. The latest project (1902) is for a canal of considerable dimensions from Southampton, by Guildford and Godalming, to the Thames at Ditton. Electric motors on the banks (Introduction to the Fourth Edition, par. 32) are to draw barges with a capacity of 250 tons dead weight, at an estimated cost of not more than 0·02*d.* per ton per mile.

the British Isles, is $4\frac{1}{2}$ miles long. It was opened in 1886.[1] With reference to natural facilities for communication it is also noteworthy that the **outline of England** encourages railway construction, for it is obvious that the value of a railway, even for inland communication, is much enhanced by being connected with a seaport.

481. In **Wales** the proportion of hilly and mountainous country is much greater than in England, and the **area of land under crops or grass or in bare fallow** is rather **less than three-fifths**. The ranges of the Welsh hills are, however, short, and there are many openings allowing an easy passage for railways.

482. Surface, Scotland. Scotland is the most mountainous part of the British Isles, and its northern half has hills and mountains so closely packed together, that even yet there are few roads leading through the narrow and sparsely peopled valleys between them (91). Long the only road across the **Grampians**—that is, the mountains lying immediately to the north of the central lowlands—was that which leads up the valley of the Garry, a tributary of the Tay, and after crossing the **Drumouchter Pass** at the height of 1,460 feet, descends a tributary of the Spey to the valley of that river. This road is now accompanied by a railway, which is continued near the east coast to the most northerly towns of the country (Wick and Thurso).

482*a*. Of the surface of Scotland **less than one-fourth is under crops or grass or in bare fallow**, and the greater part of the land fit for crops is confined to the area already referred to as the **central lowlands**, an area roughly definable as bounded by two parallel lines, one stretching from Stonehaven in Kincardineshire to the Firth of Clyde opposite Greenock, the other from Dunbar in Haddingtonshire to the middle of the Ayrshire coast. In this lowland area there lies, moreover, most of the great mineral wealth of Scotland, and therefore most of its manufacturing industry; so that this region, which has **at all periods** of Scottish history been **the most densely peopled part of the country**, now contains a greater proportion of the population than ever. Here, consequently, the Scottish railways are most closely laid, and through its southern valleys wind several railways connecting it with the lowlands on the other side and with England. The lowest of all these routes, that forming the shortest connection with England, is that by the east coast, which has nowhere to rise as much as 500 feet above sea-level. The next route, on the west, has first to climb to above 900 feet between Edinburgh and Melrose, and then to about 1,000 feet in crossing in a tunnel a spur of the Cheviots between Hawick and Liddisdale, where the main line descends to the Solway, and a branch passes eastwards to the head of the valley of the North Tyne. A still more westerly route connects both Edinburgh and

[1] A proposal to tunnel the Humber, thwarted by an adverse vote of a Committee of the House of Lords in 1873, was revived in 1907. Hull would thereby be brought half-an hour nearer London.

Glasgow with Carlisle, crossing between the valleys of the Clyde and the Annan, an altitude of 1,028 feet. By winding far to the west, through Kilmarnock, a fourth line effects a crossing at a little more than 600 feet in height in passing from the valley of the Ayr to that of the Nith. The chief obstructions to communication offered by water in Scotland are overcome by means of two of the most remarkable railway bridges in the world, the Tay bridge at Dundee, the longest of all (3,593 yards, or a little more than two miles), opened in 1887, and the Forth bridge at Queensferry, a few miles above Edinburgh, 2,765 yards, or more than a mile and a half long, opened in 1890.

483. The most important of Scottish **canals** is the Forth and Clyde Canal, which enables small sea-going ships to pass from Grangemouth on the Firth of Forth to a place on the Firth of Clyde a little above Dumbarton. This canal it is now proposed to replace by one deep enough for large ocean vessels.[1] A ship canal with a minimum depth of 17 feet has been constructed through the long narrow valley called Glen More or the Great Valley, which connects Loch Linnhe and Loch Ness, and divides the Highlands of Scotland into two sections. It is called the **Caledonian Canal**, and is noteworthy as a work of engineering, but is not much used for the purpose for which it was designed—namely, to allow sea-going ships of moderate size to avoid the stormy passage through the Pentland Firth.

484. Surface, Ireland. The larger part of Ireland is a plain, with greater stretches of nearly level country than are to be seen in any other part of the British Isles. The hills and mountains are chiefly near the corners of the island, and being from their nature thinly peopled, and not situated so as to separate more densely inhabited areas, present no serious obstacles to communication. The flatness of the country has facilitated the construction of both canals and railways. The **Shannon**, the longest river in the British Isles, has been partly canalised, and has been made navigable to the head of Lough Allen, that is, not far from its source; and it is connected by canals with Dublin by two routes, and with Belfast. The **Grand Canal** proceeds from Ballinasloe, on the Suck, a tributary on the right bank of the Shannon, to Dublin by way of Tullamore; the **Royal Canal** from a point further north by way of Longford and Mullingar; with Belfast the connection is by way of Loughs Erne and Neagh. A branch from the Grand Canal proceeds southwards to Athy, the limit of navigation on the **Barrow**, which enters the sea at Waterford Harbour on the south. The effect of superficial configuration on the railway communications in Ireland is to be seen rather in the lengthening of routes than in enforcing the crossing of high altitudes on important lines. The most serious deviations from the direct route are those due to the highland country on the adjoining borders of the counties of Tipperary, Waterford, and Cork, the railway from Cork to Waterford being thus

[1] This project is at present (1903) in abeyance.

compelled to run first 21 miles north (to Mallow) out of a total of 96 miles, and that to Dublin 36½ miles north (to Charleville) out of a total of 165½ miles. The most noteworthy obstruction presented by water is that due to the wide estuaries of the Suir and Barrow, but this obstruction was in a large measure overcome in 1906 by the opening of a railway bridge over the Barrow in connection with the route to the south of Ireland established by the Great Western Railway Company (England) by way of Fishguard (Pembrokeshire) and Rosslare (co. Wexford).

485. It is partly owing to the flatness of the surface in Ireland, where the natural drainage is in consequence insufficient, that the extent of **bog and marsh land** is so large, making up one-twelfth of the entire surface. But it must be remembered that in all parts of Europe human industry applied to drainage works and cultivation has been necessary to conquer bog and marsh, and in Ireland, as in other parts of the world in which the climate is sufficiently moist, the extent of waste due to this cause increases where agriculture is neglected. In Ireland too the extension of bog and marsh is promoted by the fact that the situation of the island causes the climate to be particularly moist (39*d*). The barren mountain land, woods and water of Ireland being also deducted, there remains **three-fourths of the surface available for agriculture**, including the rearing of live-stock.

485*a*. Relatively to population, Ireland rears more live-stock in the aggregate than any other country in Europe, and probably than any other country in the world, except "new countries." In certain species of live-stock the ratio of numbers to inhabitants is greater in one or two other European countries, but not the ratio of all collectively. This ratio in the case of Ireland has, moreover, been growing on the whole pretty steadily for many years, especially in the case of cattle, horses, and poultry. Great Britain is the great external market for the produce of this industry, and Ireland sends to the sister island large numbers of living animals and eggs, and large quantities of butter. The quality of the animals reared is still, to a large extent, in need of improvement, and hence the Irish cattle are mainly sent to England and Scotland as store cattle to be fattened. This is undoubtedly due in a large measure to the fact that Great Britain forms the chief market for the meat, and there is apt to be a considerable drop in values when meat is sent from Ireland to Great Britain, or fattened animals sent there to be killed; but the great improvements that have been made in the methods of cold storage ought to afford the means of preventing, or at least greatly diminishing, the decline in value in dead meat transported from Ireland, and hence to offer encouragement for the improvement of Irish live-stock. In the average quality of Irish butter and eggs great improvements have been effected through the agency of co-operative creameries and other societies,[1] especially in the south and west of Ireland.

[1] The establishment of these societies was due to the efforts of Mr. (now Sir) Horace Plunkett, afterwards Vice-pres. of the Dept. of Agriculture and Technical

486. Climate. The **mildness and equableness** of the climate of the British Isles as a whole have already been explained and illustrated under more general headings **(35*a*, 36, 468)**. The special advantages of the climate of the British Isles with regard to production are that it is favourable to active exertion throughout the day all the year round, and even for the most part stimulates to active exertion; that the mildness of the winter causes little or no interruption to field labour in any of the parts best suited to agriculture, and its comparative freedom from heavy snowfalls causes little interruption to communication; and that, for some reason or other, the climate seems to be unfavourable to the existence of insect pests which infest the crops of England elsewhere, while, nevertheless, it is seldom unfavourable either to crops or domesticated animals. For the sake of comparison with other countries it is well to remember that the average annual rainfall at Greenwich (in one of the drier parts of Great Britain) is about 25 inches.

486*a*. The **length of the shortest day** (sunlight) varies from about 5½ hours in the extreme north to eight hours in the extreme south. In the more thickly-peopled region the shortest day in the year is about 6½ hours in length (in the latitude of Dundee). It is to be remembered also that the shortness of the day is to some extent compensated in the high latitudes to which the islands belong by the length of the twilight.

487. Commerce. The tables in the appendix [1] show that the **foreign commerce** of the British Isles is **much greater in value than that of any other country in the world**,[2] and greater also per head than that of most other countries in which there is a population of great density. This shows that for foreign commerce this country must have peculiar advantages of one kind or another, and we must therefore consider what these advantages are.

488. The **advantages** are (1) a favourable climate; (2) the abundance of coal and iron and some other raw materials; (3) the efficiency of British labour; (4) the fact that nearly all the great mechanical inventions by which modern industry has been revolutionised originated in this country, which thus got the start of other countries in their application; (5) the abundance of capital; (6) the concentration of population in our industrial regions, facilitating the organisation of industry, including the minutest subdivision of labour; (7) the completeness of the internal communications; (8) the nearness of the coast on both sides;[3] (9) the abundance of seaports; (10) the geo-

Instruction, Ireland. With much difficulty he succeeded in getting the first established in 1889. In 1903 the number was 730.

[1] See particularly p. 602, where explanations are given with regard to the misleading character of the Annual Statement of the Trade of the United Kingdom before 1904 in respect of the countries of origin of British imports, and in some cases also in respect of the ultimate destination of British exports.

[2] Export trade behind that of the United States, since 1900, absolutely, but not per head.

[3] See Introduction to the Fourth Edition, pars. 8, 17.

graphical position; (11) the magnitude of the shipping; (12) the extent of the British colonial and other possessions; (13) the extent to which the English language is spread over the globe; (14) the long establishment of our commercial relations with the best markets of the world; (15) the free trade policy that has prevailed in this country for more than a generation.

489. The **disadvantages** that have to be placed on the other side are (1) the dearness of land arising from the density of population and the great development of industry, a disadvantage necessarily most experienced in the great centres of industry; (2) the higher rate of wages paid in Great Britain compared with those paid by its chief rivals in manufacturing industry; (3) the government restrictions on labour; (4) the backward state of education, and especially of technical and commercial education, in the United Kingdom compared with the point reached in this respect by some of its rivals; (5) the irrational spelling of the English language; (6) the want of a decimal coinage and system of weights and measures; (7) the high tariffs of many countries of the world.

490. It scarcely needs to be pointed out that the advantages and disadvantages above enumerated are not mentioned in the order of their importance. Of the advantages those from 1–6 are such as affect the production of articles of commerce, and the remainder, those which pertain to their distribution; and of the former nos. 1 and 2 may be reckoned as **natural advantages**, nos. 4, 5, and 6 **advantages** mainly **due to historical causes** (**17** and **18**). No. 3, the efficiency of the British artisan,[1] is partly to be looked on as a natural advantage arising from the climate, partly an historical advantage, due to the acquired skill resulting from the experience of generations and from familiarity with a gradual and constant series of improvements in industrial operations. (See **257**, and comp. **92** and **383**.)

491. With regard to the advantage of the climate it is unnecessary to say more; but in relation to the second of the advantages enumerated above, **wealth in coal and iron**, it is necessary to point out that the advantage we possess arises not only from their abundance, but also from the fact that important supplies of both are found quite **close to seaports**, and that the **coal** necessary to the smelting of the iron is **at no great distance from the iron ores**, in some cases on the very spot. On these points the accompanying map (p. 225) may for the most part be left to speak for itself; but it may be pointed out that the great **coalfield of Durham and Northumberland** is bisected by the estuary of the Tyne, to which belong the seaports which first carried on a great trade in coal, and is in immediate proximity to Sunderland and various minor ports, and that its southern end is close beside the **iron deposits of Cleveland** in the North Riding; that the **coalfield of Cumberland** includes the seaports of Maryport and Whitehaven, besides

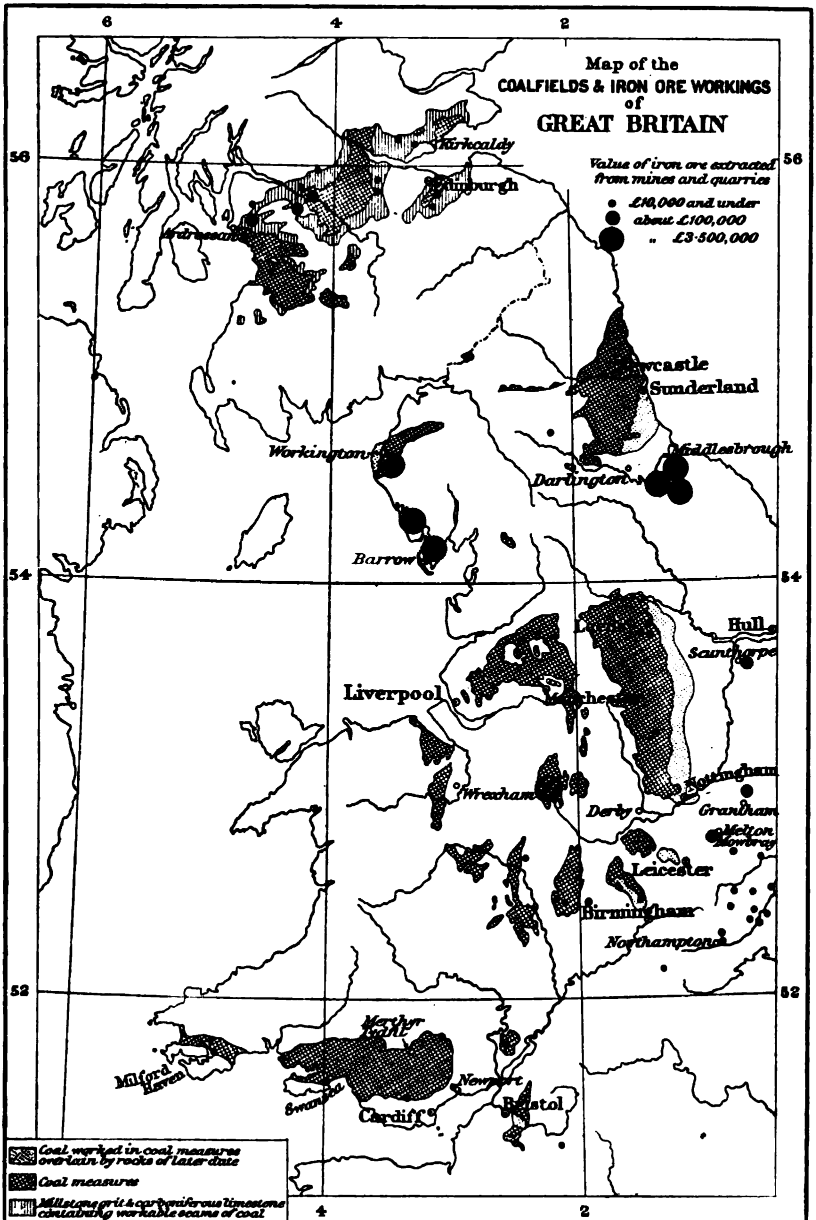
[1] See note to par. 498.

Workington, and lies close to the rich **iron ores**[1] (red hematite—**388, 393**) of **south Cumberland and north Lancashire**; that the **South Wales coalfield** has given rise to a vast iron industry through the fact of its having possessed great beds of ironstone, though these are now worked only to a limited extent, in consequence of the facility with which less refractory ores can be imported from abroad; and that in **Scotland** the coalfields are likewise close to the sea, and likewise rich in iron. In the west of Scotland the **Ayrshire coalfield** extends to the ports of Troon and Ardrossan; in the **Clyde basin** the **coalfield** extends below the port of Glasgow, and the ports of Grangemouth, Alloa, Burntisland, Dysart, Leith and others are either upon or quite near coalfields further east. The **black band ironstone** found in some parts of these coalfields (as in Ayrshire and the Clyde basin) yields a very fine quality of iron, and is itself for the most part so rich in carbonaceous matter as to reduce considerably the expense for fuel in the operations preliminary to smelting (**388**). **Limestone** and **gannister**, two other minerals of great importance in the iron industry (**388, 394; 391**), are also abundant in Great Britain, and in some cases on or near the beds of iron ore. The iron **ores** of north Lincolnshire have given rise to a rapidly growing iron industry at Frodingham (close to Scunthorpe). See also Introd. to 8th ed., pars. 48 and 48*a*.

492. In respect of mineral resources Ireland is much less fortunate than Great Britain. The most productive **coal-mines of Ireland** are at a considerable distance from the coast, in the north of the county of Kilkenny, and at a great distance from the only iron-producing district in Ireland, in the county of Antrim. The **Irish coal**, moreover, is of **inferior quality**, and the total production of coal and iron in Ireland is not equal to one per cent. of the total production of these minerals in Great Britain. Considerable supplies of iron ore (aluminous hematite) are obtained near Glenarm, co. Antrim. Fine granites and marbles are said to give promise of extensive development in Ireland.

493. The fourth, fifth, sixth, and seventh of the advantages enumerated on p. 222 require no special elucidation, though it may be pointed out that (5) and (6), the abundance of capital, and the advanced organisation of industry, are in part a consequence of (4), that is, of the United Kingdom having got the start of other countries in modern mechanical appliances. They both accordingly represent modes in which the fact of being first in the field helps in maintaining a position of priority. With regard to the eighth of our advantages, the **nearness of the coast on both sides**, it is hardly necessary to explain how this may place a manufacturing region within easy reach of many more markets than are accessible to one that has outlets only in one direction. The precise **nature of this advantage is well illustrated by the trade of some of our seaports.** Though Lancashire, on

[1] These ores are, however, not mainly smelted with local coal. The bulk of the smelting fuel (coke) has to be carried a distance of 75 to 100 miles.



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the west side of the Pennine Chain, is the great seat of our cotton manufactures, Hull exported in 1885 nearly as great a value of cotton yarn as Liverpool, Hull and Grimsby together much more than Liverpool; the eastern ports of Great Britain collectively always export more than the western ports collectively. The reason of this is apparent from the table on p. 560, from which it will be seen that continental nations are among our chief customers for cotton yarn, and these are most easily reached from the east side. The woollen manufactures, again, are mainly carried on to the east of the Pennine Chain, but the woven fabrics are much more largely exported from Liverpool than from any other port, though woollen yarns are exported thence only to a limited extent. (See the table already referred to.) The **abundance of seaports**, the ninth of the advantages enumerated above, is what enables the advantage just illustrated to be utilised; but it is obvious that it is an advantage also in another way, in the extent of the accommodation it provides for shipping. No doubt such accommodation can sometimes be provided artificially, as in most cases it needs to be improved artificially, but there is an enormous advantage in respect of cost where facilities are furnished by nature, at a great many different points. In the British Isles there are more than twenty seaports with a depth of at least twenty-five feet at high water, and most of these are situated in the vicinity of the great seats of production. In view of the increasing size of the shipping of the present day (**104**) this large number of deep harbours is a matter of peculiar importance.

494. The tenth of the advantages named on p. 222, the **geographical position** of the British Isles, is of great moment in more ways than one. In the first place the 'silver streak' is a natural bulwark of the highest value. It enables the kingdom to place its chief reliance for defence upon the navy, which makes a much less heavy drain upon the working population than the vast armies which continental nations are obliged to train and keep on foot. Secondly, it is of great importance to British commerce, as has already been pointed out (**122**), that our islands lie nearly in the middle of the land surface of the globe, or, what is of more consequence, occupy a somewhat **central position among the nations that carry on a great commerce at the present day.** It was of no importance to us that America lay on our west, until America began to rear a population more or less dependent on foreign commerce. The effects of this central position with respect to the distribution of our own products will be understood readily enough from the illustration already given of the advantage of having seaports on different sides; and another important feature of British trade largely attributable to the same cause is that which is illustrated by the tables on pp. 562 and 601, from which it will be seen that on an average about one-fifth[1] of the value of the British exports represents

[1] Still about the same proportion, though differently made up. See pp. 562, 601, and note the increasing importance of caoutchouc in this trade.

articles that have been collected from various parts of the globe, to be as widely distributed again in other parts. (See 697.) The wool of Australia and South Africa is sent by us to Germany, France, the United States, and other manufacturing countries; raw cotton is brought hither from India, America, and Egypt, and redistributed on the continent of Europe; silks are imported from France and sent to Australia along with the numerous products of British industry destined for the same market, and so on. A great variety of articles of Eastern origin are exported from the British Isles to the United States (see p. 563, n. 1). This *entrepôt* trade, as it is called, does not include the transhipment trade, or trade in goods sent from abroad to other ports abroad by way of the United Kingdom on through bills of lading.[1]

494*a*. The great development both of the *entrepôt* and the transhipment trade, is, however, not to be ascribed solely to the geographical position of this country. Two other important factors may be pointed out as contributing to this result. One is the peculiarly one-sided character of British industries. The fact that so large a proportion of the exports of the country consist of manufactured goods of various kinds necessarily makes it dependent on other countries to an unparalleled extent for imports of foodstuffs and raw materials. The large trade with all parts of the world thus based on the country's own products and requirements necessitates the employment of the vast amount of shipping, which furnishes at the same time conveniences for an *entrepôt* and transhipment trade. The other important factor referred to as likely to stimulate the trade of this class is the enormous trade in coal,[2] the indirect results of which are likely to be favourable to this trade in much the same way as it promotes our import trade generally. These circumstances likewise go far towards accounting for the enormous preponderance of British shipping, the next of the commercial advantages enumerated on p. 223; but in connection with this we have also to remember the advantages we derive from our wealth in coal and iron and the large number of our maritime population. How great that preponderance is, is shown by the table on p. 617, and with respect to its importance in the external trade of the country, it may be mentioned that, though the earnings of our shipping in foreign trade can only be guessed, the total, after making allowance for outlays on the ships abroad and on other accounts, was estimated by Sir Robert Giffen in 1898 at between 70 and 80 million sterling,[3] or considerably more than 40 per cent. of the excess of our imports over our exports in that year.

494*b*. It is obvious that much uncertainty is introduced into such

[1] The aggregate value of such goods reached in 1872 (a year of high prices) nearly 14 millions sterling. For many years it has averaged between 10 and 11 millions.

[2] See note to par. 505.

[3] *Jour. Roy. Stat. Soc.*, lxii. (1899), p. 11.

estimates by the fact that registration of shipping under a certain flag does not prove that the shipping is all owned by subjects of the nation to which that flag belongs. Much shipping under foreign flags is owned by British subjects, but, on the other hand, much foreign capital is invested in British ships. This fact was made manifest in a striking manner by the formation in 1902 of the International Mercantile Marine Company. This company was incorporated at Trenton, New Jersey, and acquired the control of most of the chief British Atlantic steamship lines,[1] whose ships, however, are still to retain British registration, although the British holding in the company amounts to only 13,000,000*l.* against an American holding of 21,000,000*l.*[2]

495. The importance of (12) the British **colonial and other possessions** to our commerce is brought out very clearly in all the statistical tables relating to the United Kingdom in the appendix (pp. 558-63, 600-2). The tables on pp. 559 and 561 reveal the fact that in all the quinquennial periods from 1861 to 1885 the different members of the British Empire collectively have furnished a larger proportion of imports of the United Kingdom than any one foreign country, and that their importance as a market for British produce and manufactures is still more striking, inasmuch as in all the periods for which figures are given they received more than one-fourth of these commodities, in the last two of them more than one-third. The steadily increasing magnitude of British commerce with the **Australasian colonies** (including New Zealand) deserves special attention. They now stand (p. 561) third[3] in the list of countries receiving British produce and manufactures, and show a steady increase in the proportion of these commodities taken by them since the period 1866–70. In the supplying of British imports they take the fourth[3] place, and

[1] The British lines transferred to the company were the White Star, Dominion, American and Leyland lines. The principal British company trading with the United States remaining outside the International Company is the Cunard Company, with which about the same time the British Government made an agreement that, on condition of its remaining a purely British undertaking for twenty years, holding for that term all its vessels at the disposal of the British government on agreed terms, agreeing 'not to unduly raise freights' or give preferential rates to foreigners, and undertaking to 'build two large steamers for the Atlantic trade of high speed,' the British Government would lend the money to build the ships, and from the time when the ships began to run would pay to the company an annual subvention of 150,000*l.*

[2] In explanation of the formation of this company it should be mentioned that at all the ports of the United States except New York, where the water frontage of Manhattan Island or the original city of New York belongs to the public authority, all the wharves are the terminal stations of the railway companies, which thus in a large measure control the ocean freights, and the American holders in the International Mercantile Marine Company have a controlling interest also in those railway companies. Unity of management will thus be given to the whole business of transporting American produce from the place of origin to the chief European markets. The company, it may be mentioned, has also concluded working agreements with the two great German transatlantic shipping companies, the Hamburg-American and the North German Lloyd.

[3] Still true in both cases in 1901–1905, though the percentage no longer shows an increase.

the percentage of the total furnished by them has increased steadily since the period 1861–65. It will be observed from p. 601 that the staple commodity of the Australian colonies, **wool (207)**, now holds by far the most important place among the exports of foreign and colonial origin, and since the period 1856–60 has shown a wonderfully rapid increase in actual and relative value; and when we consider the bulky nature of this article, and the extent to which it has in consequence promoted the development of shipping to that distant region by routes which touch many other great markets, it is easy to perceive that this single branch of trade must also have had an important indirect effect on British commerce. Still it can hardly be questioned that this branch of British trade is seriously threatened by the increasing use of the Suez Canal route for the commerce with Australia (p. 624), and by the establishment of independent wool markets in the colonies (**207***a*), which is not unlikely to lead to the multiplication of direct steamship lines to the mainland of Europe. In quite recent years there has been a rapid increase in the direct import of Australian wool into Antwerp, which offers greater facilities than London for the economical discharge of cargoes.

496. With regard to (13) **language**, in order to realise the importance of this factor one has only to think of the rapid increase of an English-speaking population, not only in the more important British colonies, but also in the United States.

497. The nature of the advantage numbered **14** on p. 228 needs no further elucidation; but with reference to the last, the **free trade** policy of this country, it is necessary to explain that in including this among the list of our advantages for foreign commerce it is not intended to prejudge the question whether a free-trade policy is or is not in all circumstances the wisest in the interests of the country generally. Undoubtedly, however, every customs' duty, whether a violation of the principle of free trade or not, is adverse to foreign commerce.

498. Of the **disadvantages** against which this country has to contend in its foreign commerce the first mentioned on p. 223, the **dearness of land**, is a necessary result of the development of our industries. The second, the **higher rate of wages**, if considered by itself, cannot but be looked upon as a disadvantage in the struggle for cheapness into which the competition for foreign commerce in a large measure resolves itself; but it must not be forgotten that in considering the cost of labour the relative efficiency of labour has always to be taken into account, and it is contended by many who have had adequate opportunities of ascertaining the facts that, as compared with the continental workman, 'the English workman, notwithstanding his shorter hours and higher wages, is to be preferred.' [1]

[1] It is extremely difficult to discover how far this is still true. In any case such general propositions must be understood in a very guarded manner; as being at the best, if true on the whole, subject to exceptions which it is impossible to set

499 The **backward state of education, and especially of technical and commercial education**, in this country is a more serious disadvantage, but its effects have been considered elsewhere (30, 31). In relation to this, it is, however, important to point out that one of the most serious hindrances to advancement in education is the fact that the English language is burdened with a mode of spelling in favour of which not one argument of weight can be advanced except the fact that it exists and is difficult to get rid of. '**English spelling**,' says Max Müller, 'is a national misfortune; and in the keen international race between all the countries of Europe, it handicaps the English child to a degree that seems incredible till we look at statistics.' [1] As a hindrance to the acquisition of the English language by foreigners, and more particularly to its spread among people to whom it would be an advantage to make the language their own, as among the non-English-speaking inhabitants of the United States and Canada, it is a check on the extension of British commerce in another way.

500. The **want of a decimal coinage and system of weights and**

forth in detail. Unquestionably it is true that some of our rivals are gaining upon us in point of skill, if from nothing else from increased experience, and in stating this I would not be understood to hint that increased skill in other countries is matter for anything else than gratification. It is frequently alleged, however, that the British workman is deteriorating, or is coming to act systematically on principles adverse to industry. This was the burden of a series of articles that appeared in *The Times* at the end of 1901 and the beginning of 1902. In these articles it was clearly shown that in some cases British workmen behaved unwisely, which could surprise no one, but this does not invalidate the proposition that I have left in the text, unless it can be shown that they do so to a greater extent than their rivals, which it was no part of the task of the writer of those articles to do. In any case, it may be pointed out that the allegations in the articles referred to were not made against all British workmen. *The Textile Mercury*, in an article quoted by *The Times* on December 31, 1901, stated: 'We are glad to say, and willingly bear testimony, that these [evils to which *The Times* correspondent referred] in their worst form are little known in the textile industries.' Now the textile factories of the United Kingdom employ upwards of a million persons, a very considerable exception. These industries, it may be pointed out, are among those exposed to the keenest foreign and imperial competition. The most numerous classes of workmen against whom the accusations of *The Times* correspondent were made were those engaged in the building trades and on railways, in connection with which the influence of foreign competition is much more difficult to discern. The most instructive comparisons on the subject here considered appear to be those between British labour and machinery and labour and machinery in America (the labour in this case being largely of British or other non-American origin). It seems to be made out that in America both employers and employed show greater eagerness in the adoption of improved machinery, and this difference would appear to have its root in the greater scope that America affords for expansion in different directions. The large tracts of undeveloped land still furnish great opportunities to unskilled labour, and in good times keep up to a high pitch the demand for skilled labour. The employers feel the need for labour-saving machinery and enabling the most skilled workmen to find their advantage in using it. The workmen generally are more keenly on the look out than elsewhere for opportunities for improving their position by change of place and even of occupation, and better provided with the means of doing so.

[1] *Contemporary Review*, November 1879, p. 381. This has been questioned, but the more I consider the matter the more am I satisfied that it can be questioned only by those who do not know the facts or will not give their mind to them.

measures is beginning to be felt more and more among the mercantile class as an evil, not only on account of the needless difficulties thus thrown in the way of education, but also as an impediment in ordinary business transactions.

501. But of all obstacles to the extension of our commerce, the greatest perhaps consists in the **high tariffs** of many foreign countries, and it is of course none the less so because these high tariffs act in the same degree, or even a greater, as a restriction on the development of the commerce of the countries maintaining them.

502. So much with regard to the advantages and disadvantages of this country in relation to foreign commerce; but we must bear in mind that the greatest possible advantages are exhaustible, and, however vast the commerce of a country may be, it is necessary to that country's prosperity, in so far as it depends on foreign commerce, that that commerce should go on increasing, and the increase keep pace with the growth of the population. Enormous as the advantages of the British Isles may be, if British commerce has been pushed too far on the strength of merely temporary advantages, other nations will be apt to gain at British expense. There will be a difficulty in maintaining the distance ahead to which British commerce has reached.

503. Now **the tables in the statistical appendix furnish many indications that** in some respects **the United Kingdom has not been holding its own in later periods**, and it is important to note some of the main heads under which this is true. The relative decline in the **woollen industry** as indicated by these tables is largely due to French competition. The table on p. 568 shows also a decline in the value of the **raw cotton**[1] imported into the United Kingdom for home consumption from 1866–70 to 1876–80, and a rise in 1881–85 to a point little above that reached in 1861–65; but certain countries with new and rising textile industries, such as Italy and Russia, show a steady increase in the value of the raw cotton imported for domestic use; the United States exhibit a constant rise in the value of the exports of their **cotton manufactures**, and there is a marked decrease in the value of the cotton yarn exported from the British Isles in 1881–85 as compared with 1871–75. From the period 1866–70 there has been a steady decline in the value of the British export of **linen manufactures** as well as **linen yarn**, a decline accordingly which went on during the period 1871–75, within which there was a great inflation of prices affecting many articles, and linen among the number (p. 619). Against this there was an increase in the value of the import of flax into the United States, the chief British market for linen goods, from 1,189,000 dollars annually in the period 1876–80, to 1,542,000 dollars annually in the period 1881–85, and that notwithstanding the fact that that article is there subject to duty. Of the products of the British textile

[1] See Introduction to the Fourth Edition, pars. 17 and 18.

industries, only jute and silk manufactures show a pretty steady increase in the value of the exports; and it is to be noted that the increase in the value of the exports of silk goods is balanced by a steady decline in the value of the net imports of raw silk (235), and that there has been a steady and pretty rapid increase in the export of raw jute during the whole series of quinquennial periods from 1861–65, while the import of this commodity for consumption at home has been stationary or declining since the period 1871–75.[1]

504. Now all these facts seem to point to at least a relative decline in the great textile industries of the United Kingdom, an increasing severity in the competition of foreign countries. France has become its severest competitor in woollen manufactures, Germany and the United States have increased their competition in silks, the United States carry on a severe competition in linen and jute manufactures, in the latter branch all the more since they have begun to utilise for similar purposes to jute the henequen of Mexico (316). Various countries are developing cotton manufactures for local consumption, if not for export, and this is necessarily more or less to the prejudice of the staple manufacturing industry of Great Britain.

505. Along with these facts relating to the textile industries of the United Kingdom brought to light by the tables in the appendix, the table on p. 560 renders prominent another noteworthy fact, that **throughout the periods from 1843–45 to 1881–85 there has been a rapid and almost uninterrupted rise in the value of the British exports of machinery and steam-engines.**[2] The only decline was in 1876–80, immediately after the great leap in 1871–75, and if there were the means of comparing quantities under this head, it would be found no doubt that in these two periods also there was an advance from the earlier to the later. Among all the exports of commodities of native origin there is none in which the rise in value is so great from the period 1843–45 downwards, and none in which the advance in this respect is at all comparable with that of machinery, except those of iron and steel (down to 1871–75), and coal, cinders and fuel (down to the last quinquennium of the nineteenth century inclusive).[3]

[1] This and the three following paragraphs are retained as they were in the first edition because the general considerations therein set forth seem to be still justified by the facts, and it may be useful to compare the facts available then with those which may now be added. See note to the end of par. 506.

[2] See note 2, p. 234.

[3] This export trade in coal is one of peculiar importance to Great Britain. Professor Jevons was, so far as I am aware, the first to point out what a large amount of our shipping is employed in the carriage outwards of this one commodity, and the fact was afterwards repeatedly emphasised by Sir Rawson Rawson, who made calculations on this head based on the assumption that four register tons of shipping would be required to convey nine tons weight of coal. Taking the same basis on which to form an estimate, we find that the 39,400,000 tons of coal annually exported on the average in the last five years of the nineteenth century must have required for its transport nearly 48 per cent. of the shipping cleared from the British Isles with cargoes during that period. In 1898 coal was estimated

506. Such facts as these are all in keeping with what has been noted regarding the relative decline in textile manufactures. They all tend to show that other nations are developing textile manufactures at the expense of the United Kingdom, and more or less with the aid of machinery and fuel supplied by that country. And in this there is nothing surprising. It is a state of things 'due in a great measure to the enormous prosperity we enjoyed for so many years, drawing population into our towns and stimulating early marriages, without a thought of what was to happen when we had taught other nations our arts, and they were to compete with us not only abroad, but at home, and in all our colonies and dependencies.'[1] It is true that the development of native manufactures in foreign countries is in some cases aided by protective duties, but this is not the sole circumstance to which their progress is due. We cannot put out of sight the fact that, however great the advantages of the United Kingdom may be for the carrying on of manufacturing industries and foreign commerce, these advantages were necessarily relatively much greater at a period

to make up 86 per cent. of the total weight of British exports (see p. 449 of the paper by Mr. D. A. Thomas, M.A., M.P., in the *Jour. Roy. Statist. Soc.*, vol. lxvi., on the 'Growth and Direction of our Foreign Trade in Coal during the last half Century.' Professor Jevons also pointed out the indirect importance of this traffic to the commerce of the United Kingdom, through the fact that the ships that go out laden with coal are ready to bring back cargoes of foreign goods at low freights. Professor Marshall thinks that he somewhat exaggerated the importance of this feature of British trade, inasmuch as many of our colliers return regularly in water ballast. In short voyages that is true, but there can be little doubt that the export of coal to Argentina and California must contribute to the cheapness of homeward freights from those distant parts of the world, or reversely that it would not be possible to export coal to the Pacific seaboard of the United States, as we do, if it were not for the homeward freights of wheat. Mr. C. H. Wilson, of Hull, has pointed out in a letter to *The Times* (December 22, 1902) that much of our trade with the Continent is made up of coal and manufactures out in exchange for sugar and general cargo home. (See also Mr. Thomas's paper, as above, p. 18.) This coal trade is regarded by some with little satisfaction. It is considered by them that it would be better to retain for ourselves the raw material on which the manufacturing industry of the country so largely depends. Those who take this view look upon the export duty of 1s. per ton which was laid upon coal in 1902 as a step in the right direction. To me, however, it seems that this view can be held only by those who look at but one-half of the facts. They look forward to a time when our coal will be used up or become too scarce and dear to be economically useful; but the policy they advocate would only postpone that date—would not prevent it from arriving. Moreover, if it were practicable to retain all our own coal for our own use, it would lead to the further stimulation of manufactures and population within Great Britain, so that when the time apprehended arrived there would be a larger population to provide for in some other way. The policy of unrestricted trade in coal tends to distribute the population created by it over a wider area, and on that account this trade seems to me one of the healthiest parts of the trade of the United Kingdom. It is to be hoped that the change due to the increasing dearness of coal will come about so gradually that the population affected thereby (wherever situated) will be able to adapt themselves to it. It is also to be borne in mind that a large part of the coal exported by this country is for the use of steamers coaling abroad, the greater proportion being British steamers (see Mr. Thomas's paper, p. 31).

[1] Sir Theodore Martin, in a letter to Lord Brabazon, published in *The Standard*, March 28, 1887.

when the British Isles had coalfields more or less developed, and other countries had not, when these islands had already effected the change from domestic and hand-labour in spinning and weaving and other countries had not, than at a time when these changes have been brought about in other countries or are in rapid progress. Hence it was inevitable that foreign countries, and especially those provided by nature with coalfields or abundant water-power, should gain upon the United Kingdom in the great branches of industry to which modern machinery is chiefly applied; and though to us this may be the cause of temporary hardship, the result, as has been already hinted (16), must be regarded as on the whole satisfactory,[1] as tending in the direction of that equal distribution of industry and comparative stability which, we hope, it is the mission of commerce to realise.[2]

507. The **local distribution** of British **manufacturing industries** presents many points of interest, some of them purely geographical, some historical. In the case of the greatest of these industries, that of **cotton**, it is a noteworthy fact that it is almost wholly confined to a few localities in the west of Great Britain and the north-east of Ireland. In England the spinning and weaving of cotton are almost restricted to the west side of the Pennine Chain, mainly to that part of Lancashire which lies to the south of the Ribble; in Scotland, to Glasgow and other manufacturing towns in the west. The reason for this **distribution** is **geographical**. In the first place this is a region of cheap coal (491). But, secondly, both for the spinning and weaving of cotton a **moist climate** is of great importance, and in districts where the manufacture is carried on, dry weather, and especially cold and dry weather, adds considerably to the expense of the operations; for where the air is too dry the yarn is liable to become brittle through losing its

[1] On the advantages of a more equal distribution of mechanical industry, see some wise remarks in George Combe's *Lectures on Popular Education*, 2nd ed., pp. 63–7.

[2] The relative decline in our textile and concurrent advance in our machine industries are discussed from a general point of view in the Introd. to the Fourth Edition, pars. 17 to 21. The relative value of the aggregate exports of the products of the British and Irish textile industries, including apparel and haberdashery, declined from the maximum of 61·2 per cent. of the total exports in 1866–70 to 40·1 per cent. in 1901–5. In the same interval the value of the machinery and steam-engines exported increased from 2·6 to 6·9 per cent., that of coal from 2·8 to 9·5 per cent. A comparison of the figures for 1896–1900 and those for 1901–5 shows that in that interval all classes of textile exports suffered a decline in their percentage value. The absolute values of the exported products of all our great textile industries reached their maxima down to 1903 inclusive in the years 1888–1890—those of silk in 1888, jute, linen and woollen (including worsted) in 1889, and cotton in 1890. In all cases yarns are included. Since 1903, however, a great advance has taken place in all textile exports except silk, above all in cotton, the total value of the exports of which in 1907 was £110 millions, or nearly 50 per cent. above the value of 1890 (£74·4). The United States still takes about 60 per cent. of the value of exported linen piece-goods; and as showing our power of competing in this industry against heavy duties (amounting, where not specific, to from 30 to 50 per cent. *ad valorem*) it may be mentioned that the value of our exports under that head to the United States in 1907 was £2·98 millions as against £2·11 millions in 1889, the year of our previous maximum total export.

natural moisture, and all the more likely is this to result when, as on cold days, the temperature of the spinning-'mill' or weaving-'shed' is much above the temperature of the air outside. So important is this factor in the cotton industry that the failure of cotton factories started in other parts of England has been attributed in some cases to no other cause. Even the shelter of a hill against dry east winds is considered a matter of high pecuniary value. Why the parts of the British Isles just referred to should be specially moist will be readily understood from what is stated under general headings as to the effect of high grounds on moisture-laden winds (39) and the prevalence of such winds from the south-west in this part of the world (35*a*).

507*a*. In England the town most closely associated with the cotton industry is **MANCHESTER.**[1] This is one of those towns which owed their original importance in a large measure to the fact of their lying in a plain just on the border of hill country, a position which, as already explained (114), naturally leads to the convergence of roads from many parts of the plain as well as from one or more valleys among the hills. It is hence natural to find that a town has been situated in this position from a very early date. Manchester (the ancient Mancunium) was already in existence in the time of the Romans, and in the early part of the fourteenth century it became known as a manufacturing town through the settlement of Flemings here. But the first materials of its textile manufactures were wool, a local product, and linen yarn obtained from Ireland. It is uncertain when cotton was added to these, and though Manchester cottons are spoken of even in the fourteenth century, it was not till long after that pure cotton fabrics were made there, or anywhere else in England (253). Since the great inventions of the eighteenth century, Manchester has grown with the cotton industry, the trade in cotton goods and yarns having always been centred here (117). In 1774 Manchester and Salford together had a population of little more than 27,000; at the census of 1801 the joint population of the two townships had risen to 84,000. (Compare 254.) In 1891 the population within a radius of twelve miles of Manchester Exchange was upwards of 1,600,000.[2]

507*b*. Among the surrounding towns engaged in the cotton industry are **Oldham, Bolton, Bury, Rochdale,** and other towns which have enriched the bleak Lancashire moorlands to the north and east of Manchester, **Stockport** and **Hyde** in Cheshire to the south, and **Glossop** in a Derbyshire valley south-east of Manchester: all situated on the great coalfield west of the Pennine Chain; and further north are **PRESTON, BLACKBURN, Accrington,** and **Burnley,** all Lancashire towns, and the last three likewise situated on the same coalfield.

[1] Population, including Salford, 765,000, and including other contiguous urban areas, at least 900,000.

[2] In 1901, upwards of 2,100,000.

OLDHAM and **BOLTON** are the two towns most noted for **cotton-spinning** mills, the former being engaged chiefly in the production of medium yarns, the latter of the 'higher counts.'[1] The northern towns of **Burnley, Blackburn, Preston, Nelson,** and **Accrington,**[2] all situated along the route of the railway from Preston to Skipton, take the lead in **cotton-weaving.** All these towns are just at the base of the Pennine Chain, some at a level of above 500 feet. Wigan, though it is also a cotton-manufacturing town, is notable chiefly as the principal centre of the coal-trade in Lancashire. There seems to be at present a tendency to an increased concentration of the British cotton industry, at least in cotton spinning. Between 1884 and 1888, when the number of cotton spindles declined on the whole in the United Kingdom, the only increase was in the Oldham district.

507c. For its supplies of raw cotton the great cotton manfacturing region of England is still dependent mainly on Liverpool, but direct shipments of cotton now come to Manchester by means of the ship-canal constructed between 1887 and 1893 and opened for traffic on the first day of 1894. It extends from Eastham on the south side of the Mersey to the heart of Manchester, has a total length of 35½ miles, a bottom width of 120 feet[3] (as compared with 72 feet in the Suez Canal), and a minimum depth of 26 feet. It is thus available for all but the largest ships, and vessels nearly 500 feet in length and capable of carrying as much as 10,000 tons dead weight have been built for the trade of the port. There are now regular lines of steamers, not only to various British ports, but to many European and transatlantic ports—Antwerp and Rotterdam, Bergen and Christiania, Libau, Riga, and St. Petersburg, Montreal and Quebec, New York, Philadelphia, and Boston, and during the cotton-shipping season to New Orleans and Galveston. A regular fruit trade is now carried on with Port Antonio, Jamaica. The traffic of the port, which extends to Ince and thus includes Runcorn, has grown steadily and rapidly.[4] In the case of the Manchester ship-canal it has also to be borne in mind that its whole length is laid through a part of the busiest industrial region of England, so that it may be looked upon as destined to form a double line of quays with a total length of 70 miles.

[1] In 1900 there were no fewer than thirty-five towns in South Lancashire and the parts immediately adjoining which had at least 100,000 spindles engaged in this industry, Oldham heading the list with nearly 12 millions and Bolton following with 5 millions.

[2] These were the only towns which in 1900 had each more than 30,000 power-looms.

[3] This width, which is such as to allow of large vessels passing each other, is considerably increased at the five locks, the lowest of which is at Latchford near Warrington; but there are four reaches between Latchford and Partington, with an aggregate length of about one mile, in which the bottom width is only from 80 to 90 feet, so that in these parts large vessels cannot pass each other.

[4] In 1894 the total value of the trade of the port was £6·9 millions (about 40 per cent. imports), in 1909 it amounted to £43·5 millions (66 per cent. imports).

507*d*. At a distance from the Manchester district the only large town in which cotton manufactures form the staple industry is **NOTTINGHAM**[1] on the Trent, in which certain branches of the manufacture, that of **cotton hosiery**, and the making of **machine-made net and lace**, have their chief seat. In these branches of the industry the yarns used are mostly strong and not exposed to any great strain in the processes of manufacture, and hence a moist climate is not so essential to success as it is in the branches carried on in Lancashire. Of late the staple industry of this town has suffered from the competition of Chemnitz (**584**: comp. **30**) and other continental rivals.

507*e*. In **Scotland**, though cotton manufactures are carried on very largely, the only town whose name is specially associated with a branch of this industry is **Paisley**, in Renfrewshire, where the manu-

As the nature of the case renders the growth of the port of Manchester of peculiar interest some details are here given:—

Principal Articles of Trade of the Port of Manchester. Percentage of the Total Trade of the United Kingdom in the Articles Named at Liverpool (L.) and Manchester (M.) by Quantity (Machinery by Value).

Imports		1893	1894	1906	1909
Raw cotton	L	92·3	90·5	77·7	76·7
	M	—	1·6	16·6	17·5
Paper-making materials	L	10·8	10·4	8·0	2·3
	M	—	4·1	14·3	10·5
Wood, sawn and hewn	L	9·2	8·2	6·6	9·5
	M	—	1·2	5·6	8·8
Manganese ore	L	—	—	20·6	12·5
	M	—	—	7·3	6·5
Petroleum	L	22·4	19 9	9·9	9·1
	M	—	0·3	12·1	11·3
Wheat	L	28·9	25·3	25·6	22·7
	M	—	0·1	5·3	6·6

Imports		1893	1894	1906	1909
Maize	L	25·0	24·9	22·9	19·3
	M	—	0·1	2·4	2·4
Bacon & hams	L	63·3	61·7	51·4	44·4
	M	—	—	1·9	2·0
Exports					
Cotton tissues	L	75·9	74·2	69·0	67·7
	M	—	3·6	9·1	10·3
Cotton yarn	L	39·4	35·7	34·2	33·4
	M	—	17·2	22·2	27·0
Woollen and worsted tissues	L	48·2	40·3	57·2	56·1
	M	—	0·5	2·6	2·3
Machinery, &c.	L	34·3	31·2	32·4	33·4
	M	—	2·1	5·1	6·4

It will be observed that petroleum, an article of comparatively small value in proportion to its bulk (for 1906 it may be roughly estimated at about £7 per ton as against £67 per ton for raw cotton), an article largely conveyed in special steamers and in the form in which it enters into consumption by the multitude, is the commodity in which the trade of Manchester has grown most rapidly to the prejudice of that of Liverpool. This is a natural result of the better situation of Manchester with reference to a consuming population. In paper-making materials we have another bulky article (average value in 1906, £6·3 per ton), and in relation to it we have to consider the situation of the mills, and with reference to that again the situation of the streams supplying the water and that of the consumers of the product. Raw cotton is by far the most valuable of the articles imported at Manchester. The growth of that import as compared with the corresponding import at Liverpool is steady, but seems surprisingly slow. It shows the difficulty of displacing an old market requiring a high degree of organisation, but it seems probable that the advance of Manchester under this head will go on at an accelerated rate when the growth in the total trade has reached such a point as to favour higher organisation of the market. The hold which Liverpool retains on the export trade of cotton tissues is not surprising to any one who considers the widespread distribution of the markets for these products (p. xxxiii, *n*) and the relations of the chief weaving towns (507*c*) to the ports of Liverpool and Manchester respectively.

[1] Population, 240,000.

facture of **cotton thread** has its chief seat. The cotton fabrics mostly made in Scotland are very fine lawns, muslins, and certain kinds of figured and coloured dress goods.

508. The **West Riding of Yorkshire**, where there is another large coalfield, is for the **woollen industry** of Great Britain pretty much what Lancashire is for the cotton industry, though this section of the textile manufactures of the country is not so restricted in its range as the other. The principal **centre** of the trade of this region is **Leeds**, which occupies a situation geographically very similar to that of Manchester.

508*a*. LEEDS[1] stands on the Aire amidst the gently undulating country that lies between the broad flat Vale of York and the narrow dales on the west. It thus has free communication with the north, east, and south-east, and on the west it commands two principal lines of communication, one by the valleys of the Calder and Colne to Manchester and South Lancashire, the other by the valley of the Aire to Mid Lancashire. Like Manchester, it is a very old seat of trade and manufacturing industry. It is described by Camden (1607) as 'much enriched by the woollen manufacture,' and nowadays, while still retaining its importance in the woollen trade, it has added to that many other important industries. Besides being the chief centre of the wholesale **clothing trade** in the country, it probably stands first also in the **leather** trade, and is developing large **iron and steel** manufactures.

508*b*. The narrow dales of Yorkshire to the west of Leeds are filled with larger or smaller manufacturing towns engaged in the woollen industry. In some of them its origin belongs to as remote a date as in Leeds itself, these dales 'well supplied with water, fuel, and cheap provisions,' and surrounded by sheep pastures yielding a fine lustrous wool, having been among the localities to which the woollen industry migrated at the close of the middle ages, when the expense of living hindered its prosperity in more ancient seats nearer London. In **Wakefield** and **Halifax** as well as in Leeds foreign artisans were settled by Henry VII. in 1489, and a generation later Halifax was already noted for its products in this branch of manufacture. When modern machinery was introduced the abundance of coal in the region served to stimulate the industry in those valleys still further, and many of the towns now engaged in the manufacture date their rise only from that period.

508*c*. At the present day the centre of all branches of the worsted manufacture (**214**) is **BRADFORD**,[2] which is situated in a small basin among the hills to the west of Leeds and a little to the south of the Aire. It has likewise large silk, velvet, and plush mills (in which the raw material used is schappe or spun silk—**235**), and close beside it on the Aire itself is the model town of **Saltaire** with its great alpaca

[1] Population, 430,000.

[2] Population, nearly 300,000.

works (211). **HALIFAX** in the Calder valley is now known for its lighter worsted fabrics, its baizes and carpets. **Huddersfield** on the Colne, a tributary of the Calder, though not even mentioned by Camden, is now pre-eminent in the manufacture of high-class fancy goods as well as plain fabrics. **Dewsbury** and **Batley** manufacture heavier fabrics, including blankets and shoddy. **Wakefield, Barnsley, Keighley, Morley, Heckmondwike**, in fact almost every place that has a name in this region, are all engaged in some branch of the great industry. Even on the west side of the Pennine Chain there are some towns that still carry on their old woollen manufactures. **Rochdale** has flannel mills, and **Bury, Ashton**, and **Glossop** all manufacture woollens of some kind.

508*d*. The district in the **west of England** that early became known for its 'cloths' as distinguished from the 'stuffs,' for which the bulk of English wool was best adapted (203), still retains its renown in connection with this manufacture, and especially for the making of **broadcloth**. In some of the towns in which the industry was formerly pursued it has died out, but it still flourishes at **Stroud** in Gloucestershire and in the Stroud valley generally, and at **Bradford** and **Trowbridge** in the west of Wiltshire. Worsteds as well as woollens are now, however, also manufactured in this district.

In the far north it is interesting to note that **Kendal** still retains something of the industry for which it was already known before the close of the fourteenth century, but in the east of England, where numerous towns were once noted for their woollen or worsted goods, even **NORWICH** has lost nearly all its textile industries, although in virtue of the advantages due to its central situation in a fertile part of the country and to its still being accessible by sea, it continues to carry on important manufactures of one kind or another (mustard, starch, stoves, boots and shoes, agricultural implements, &c.).

508*e*. LEICESTER,[1] throughout its history as a manufacturing town, has been the chief seat of woollen hosiery in England, which is no doubt in a large measure due to the fact that the **Leicestershire breed of sheep** yields one of the finest wools for the making of **worsted** yarn (214), and more recently to its lying on a coalfield. The making of lace and elastic webbing has been added to its textile industries. **Kidderminster** in Worcestershire and **Wilton** in Wilts are still celebrated, as they long have been, for their **carpets**; but it is to be noted that 'Brussels' carpets (215) are the specialty of Kidderminster. The so-called Kidderminster carpets are made chiefly in Scotland and the Yorkshire woollen district.

508*f*. In **Scotland woollen manufactures** form the staple industry chiefly in certain towns in the **basin of the Tweed, Hawick** and **Jedburgh, Galashiels, Selkirk**, and **Innerleithen**. which are chiefly

[1] Population, above 200.000

noted for the kind of fabric appropriately known as **tweeds**, in the making of which, however, they now have a rival in **Dumfries**, as well as in many of the Yorkshire manufacturing towns. The prosperity of some of these towns was greatly promoted at one time by the abundance of water-power afforded by the streams, but nowadays this source of power is not much used, and the continued prosperity of the industry of the district is all the more striking from the fact that it lies remote from any productive coalfield. Besides tweeds **woollen hosiery** is made at **Dumfries**, and **carpets** and other woollen goods are made at **Ayr** and **Kilmarnock** on the Ayrshire coalfield.

509. In Ireland the woollen industry was checked by the repressive measures of the English Parliament at the close of the seventeenth century, but, on the other hand, **linen manufactures** have flourished there from a very early date (193–95). In modern times this latter industry has undergone the process of concentration that has affected all others, and in Ireland the manufacture is now nearly confined to **BELFAST**[1] and the district round. In this district it first received an important stimulus at the end of the seventeenth century through the settlement of some Huguenot families, after the revocation of the Edict of Nantes, at Lisburn on the Lagan above Belfast. The linens of Belfast and the neighbourhood include those of the finest quality, and one great advantage enjoyed by the district for the production of such goods is the excellence of the spring-water used in bleaching, so that linens woven even in Bohemia, it may be from Belfast yarns, are sent to Belfast to be bleached. For the finest linens flax is imported from Belgium (555), but large quantities are also imported from Russia. In Scotland the chief centre of the linen manufacture is **DUNDEE**, but there, as well as in **Arbroath**, **Montrose**, and one or two other eastern towns, it is chiefly the coarser linens that are manufactured, the raw material all coming from Russia or other parts of the Baltic. This branch of industry has been mainly carried on in Scotland north of the Firth of Tay since the eighteenth century, and its predominance in those parts may perhaps be ascribed to the fact that the ports of that part of the country are the first reached by ships that round the north of Denmark. **Dunfermline** in the west of Fife has been noted for its damask table-linens since the early part of the eighteenth century. **In England** it forms the staple industry of the Yorkshire town of **Barnsley**, and fine linen damasks are largely made at Canterbury. Besides **Dundee**, **Sunderland**, **Stockton**, and other seaport towns carry on large manufactures of **sailcloth**, which is now a branch of the linen industry.

510. Jute yarns and tissues, though mainly exported from London, Liverpool, Glasgow, and other ports which carry on most of the trade with the countries requiring these materials for the making of sacking, are still manufactured most largely at **Dundee**, where the industry was first introduced in this country.

[1] Population, 350,000.

511. The **silk industry** of the British Isles is almost confined to England, and is still pursued principally in the district where it was first firmly established, **Derbyshire and the neighbouring parts of Staffordshire and Cheshire**, where the streams furnish pure water, an important requirement of this manufacture. **DERBY**, **Ilkeston**, and **Chesterfield** in the first-named county, **Macclesfield** and **Congleton** in Cheshire, **Leek** in north Staffordshire, are among the towns chiefly engaged in this pursuit. **Leek** is specially noted for its **sewing thread** and its **silk-dye works**, the water of the neighbourhood being among the best dyeing waters of Europe. Silks of one kind or another are also made in many other places. **Coventry** is noted for its ribbons. Silk plush for hats is largely made in Leicestershire; velvets and plushes, as already mentioned, are manufactured at **Bradford** (Yorks), and there are also silk factories in the **valley of the Kennet** in Berkshire. The industry was introduced by the Huguenots into London, and the manufacture of umbrella silk is still carried on there in Spitalfields and Bethnal Green. An important silk factory has also been established at **Braintree** in Essex.

512. The **products of the various textile industries** of which the chief seats have just been indicated made up (if we include apparel, millinery, &c.) in the period 1881–85 very **nearly 50 per cent.**[1] of the total value of **the British exports** of native produce and manufactures. Next to them collectively, next to cotton manufactures separately, came in this respect **iron and steel** and their products, which, if we include among them steam-engines and machinery of all kinds, hardware and cutlery, made up in the period mentioned **rather more than** 18 per cent. of the exports of the United Kingdom.[2]

513. The chief seats of **iron-smelting** are at and round **Middlesbrough** in the North Riding of Yorkshire and the south of Durham (491); in South Wales and the adjoining part of Monmouth round **Merthyr Tydfil** in the north of Glamorganshire, at **Newport** at the mouth of the Usk (Monmouth), and elsewhere; in north Lancashire and Cumberland at **Barrow**, **Workington**, and many other places conveniently supplied with red hematite from the neighbouring deposits (491); in north and south **Staffordshire**; in the **West Riding of Yorkshire**; and in Lanarkshire, at **Airdrie**, **Coatbridge**, and other places in the basin of the Clyde, and in north and east **Ayrshire**. Unfortunately the Cumberland coal is not generally suitable for iron-smelting, and most of the fuel has to be brought to this district in the form of coke from the east of England, a distance of 75 to 100 miles. Both Cumberland and Lanarkshire are becoming increasingly dependent on Spanish ores.

513*a*. The towns and seaports of Barrow and Middlesbrough have both risen into importance since about the middle of the nineteenth

[1] See note 2 on p. 234.
[2] In 1896–1900 about the same proportion.

century through the working of the iron ores in their vicinity. The hematite ore near **Barrow** was held in high repute long before facilities existed for working it on a large scale. These facilities were first provided by the opening of a short line of railway from the quarries to the coast. Furnaces and ironworks rapidly rose up, and an excellent harbour has been simply formed by the enclosure of the channel between the mainland and the small island opposite. **Middlesbrough**, which is situated on the south side of the Tees, and accordingly in Yorkshire, owes its rise to a bed of iron ore, previously discovered in the valley of the Esk, near Whitby, being traced in 1850 to the vicinity of the present town. The situation of Middlesbrough being convenient for obtaining supplies of coal from north Durham and the Tyne, and of limestone (388), which crops out on the surface within a distance of 40 miles to the north-west, thus presented all the conditions for the establishment of a great iron industry. To make it at the same time a great seaport all that was necessary was to dredge the estuary of the Tees to a depth sufficient to admit large vessels, and to create a harbour protected from the waves of the North Sea. Both of these objects have now been accomplished, the latter by the construction of a breakwater, the material of which consists of the scoriæ from the neighbouring blast-furnaces. The ores for the iron industry of South Wales and Monmouthshire are now mainly of Spanish origin (393). The ports of Newport, Cardiff, and Swansea receive a large proportion of the iron ore imported into the United Kingdom, but this commodity also comes in large quantity to Glasgow and Ardrossan, Middlesbrough, and the Tyne ports.

513*b*. The relative decline in the iron industry of the United Kingdom, indicated by the figures in par. 397, reveals a growing competition on the part of other countries also in this department of British industry. In keeping with this, we find in recent years a tendency in the iron industry to become concentrated in the maritime centres of production, a fact which serves at once to mark in another manner the increasing keenness of competition, and to illustrate the advantage that Great Britain owes to its easily reached sea-board. Iron-works in the West Riding of Yorkshire, in Staffordshire, and Shropshire have been transplanted to the coast. The excellent dock and river-side accommodation at Newport, together with the other advantages of that place, is attracting thither ironworks of various kinds from the Midlands. Another effect of the keen competition in this industry has been an agreement under which the articles of iron and steel mostly used in engineering are to be produced in large quantity in standard sections, and a great economy thus secured in their production. The leading British purchasers of such articles have agreed to order only the sections fixed by a committee appointed for the purpose.

513*c*. In connection with the manufacture of articles made from iron, two towns in England are specially noteworthy—**Birmingham** and **Sheffield**, both being towns which became engaged in the working of

metals at a very early date, and have grown to a large size through the prosecution of such industries down to the present day.

513*d*. **BIRMINGHAM**[1] lies almost exactly in the middle of the plain between the rivers Trent, Severn, and Avon. The surrounding forests (386), together with abundance of iron ore in the neighbourhood, seem to have determined the form of the industry which grew up here. The smiths of Birmingham are mentioned as early as 1538. Under the name of Bremicham the town is described by Camden in 1607 as 'swarming with inhabitants, and echoing with the noise of anvils.' In 1727 its iron and hardware manufactures were estimated to employ or support upwards of 50,000 people. At the present day not only does Birmingham itself swarm with inhabitants and echo with the noise of anvils to a much greater extent than ever it did before, but the whole of the adjoining part of South Staffordshire is crowded with large and small towns, **Wolverhampton, Walsall, Wednesbury, West Bromwich,** to which may be added **Dudley**[2] (in a detached part of Worcestershire), the inhabitants of which are all mainly engaged in similar occupations—the **making of all kinds of articles in steel and iron, as well as other metal wares,** from the largest to the smallest. All kinds of domestic ironmongery are the chief products of this district, but steam-engines and machinery, as well as needles, pins, and buttons, are also important articles of manufacture. **Bromsgrove, Redditch,** and **Stourbridge** in Worcestershire belong to the same group of towns in respect of the nature of the industry which they carry on. Redditch is the most important place of manufacture of needles and fish-hooks in the world.[3]

513*e*. **SHEFFIELD**[4] lies in a hollow in the south of Yorkshire (see map, p. xli). The neighbourhood supplies both coal and iron as well as water power and excellent grindstones (423·16), long used in the making of **cutlery,** including fine cutting tools and the best tool-steel. A great stimulus was given to this industry by the discovery in 1740 by Huntsman, a Sheffield cutler, of the improved method of making cementation or crucible steel (390). But since the introduction of the Bessemer process of steel-making here in 1858 Sheffield has become the seat of steel industries on a much larger scale, making ships' plates, armour-plates, tires and axles, ordnance, and all kinds of steel castings and forgings. For the finest work it has for hundreds of years imported the best raw material from Sweden (387).

513*f*. Many other towns in England are known chiefly in connection with one or more branches of the iron and steel industry.

[1] Population, including the contiguous borough of Aston Manor, about 600,000.

[2] The aggregate population of the continuous urban area comprising Birmingham and all these towns was in 1901 about 1,300,000.

[3] In the district embracing all these towns extensive works are now (1903) being established for the supply of cheap power gas on the Mond system, in which ammonia is an important by-product.

[4] Population, nearly 400,000.

Middlesbrough and **Barrow** manufacture great quantities of **rails**. **Warrington**, on the Mersey, in Lancashire, produces iron wire, &c. The making of **tin- and zinc-plate**, which furnishes the most important export to the United States under the head of ironwares,[1] is scattered over all the industrial towns of the **South Wales coalfield** (**Swansea, Llanelly, Cardiff, Newport, Neath, Monmouth, Pontypool, Aberavon,** &c.). The making of **machinery for textile manufactures** is carried on mainly, if not wholly, in some of the towns in which these manufactures form the staple industry. Cotton-spinning and weaving machinery is made at **Manchester, Oldham, Bolton, Accrington** and other towns in the cotton-manufacturing district. In the same towns machinery belonging to the woollen industry is also made, but the great machine-making town for all departments of the **worsted** industry in particular is **Keighley**, in the Aire valley, a little to the north-west of Bradford. Machinery for the manufacture of **elastic webbing** is made at **Leicester.**

513*g*. Steam-engines and railway-carriages are made at **Manchester, Birmingham, Glasgow, Newcastle, Darlington,** and several smaller towns, where different railway companies have established such works for their own lines. The London and North-Western Railway has an establishment of this kind at **Crewe** in Cheshire, the Great Western at **Swindon** in North Wilts, the London and South-Western at **Eastleigh** near Southampton, the Great Northern at **Doncaster**, the Midland at **Derby**, the Cambrian at **Oswestry**, the Glasgow and South-Western at **Kilmarnock.** In the selection of such places the companies have obviously been guided by the desire to find a place on their own line where land was cheap, rather than places in the vicinity of coal and iron supplies, which they can carry themselves at a minimum of cost. **Agricultural implements** are made in many towns belonging to the corn-growing districts, as at **Grantham, Gainsborough, Lincoln,** and **Norwich.**

514. Shipbuilding may now also be considered as mainly a branch of the iron industry. Not very many years ago the Thames was the chief seat of this industry in Great Britain, and it was the change from wood to iron as the material for shipbuilding that gave the decisive blow to the industry on the Thames, which had already begun to find a keen rival in the **Clyde.** This latter river is now the chief seat of shipbuilding in the world—of shipbuilding in all its branches, including the making of **marine engines.** Shipbuilding yards succeed one another for miles below Glasgow, and are met with at other places lower down, especially at Dumbarton and Greenock. Next to the Clyde in shipbuilding come the **Tyne**, the **Wear**, the **Tees,** and the **Hartlepools**, and in Ireland **Belfast.**[2] To a less extent the

[1] Nearly half the total value even in 1901.

[2] One of the two great Belfast firms, that of Harland and Wolff, has made an agreement with the International Mercantile Marine Company (494*b*) to build.

industry is carried on at **Hull**, **Liverpool**, **Barrow-in-Furness**, **Southampton**, &c. There are **government dockyards** at Chatham and Sheerness in the Thames, at Portsmouth, Devonport, at Pembroke on Milford Haven, and at Haulbowline on Cork Harbour, and a new one is to be established at St. Margaret's Hope in Fifeshire on the north side of the Firth of Forth just above the Forth Bridge.

515. Coal and Coke, the next articles to iron and its products among British exports of domestic origin, are chiefly **exported from CARDIFF, Newport, and Swansea**, the outlets of the South Wales coalfield, and the **Tyne ports (NEWCASTLE**[1] **and North and South Shields)**, **SUNDERLAND**, and **Hartlepool**, the outlets of the Northumberland and Durham coalfields. The excellence of the **smokeless coal** furnished by the eastern part of the South Wales coalfield as fuel for steam-engines has caused **Cardiff** to outstrip Newcastle in the export of coal to foreign countries, but Newcastle and Sunderland still rank first among the ports which supply coal in coasting vessels for domestic use, their convenient situation for the supply of London being much in their favour.

516. Next to coal among British exports of native produce and manufactures comes **copper**, with the various articles made out of that metal. As far back as the time of Queen Elizabeth, **Swansea** had a large business in the smelting of copper ores brought from Cornwall and Devon, the only English counties where this metal is found in great abundance. This business still continues, but nowadays **not only copper ores, but also those of silver, zinc, lead, and sulphur**, are brought hither from all parts of the world to be smelted, and more or less of the resulting metal is re-exported as British produce. **Llanelly**, in Carmarthenshire, shares in the industries of Swansea. In the making of articles from copper alloys, brass, bronze, &c., **Birmingham** takes the first place, as it does in all kinds of hardware; but **Rotherham**, on the Don, is also noted for its manufactures of brass.

517. Among British ores, lead and tin are now of more importance than copper, and both of them, being comparatively easy of treatment, are smelted chiefly in the neighbourhood in which they are produced. **Lead** is obtained most abundantly in the **Isle of Man**, the west of **Durham**, and other northern districts; **tin** chiefly, like copper, in **Cornwall and Devon**. The vessels which take to South Wales the copper ores of these counties bring back thence supplies of coal for the smelting of the ores of tin.

518. The making of **earthenware and porcelain** is another industry which involves a great consumption of fuel, and is hence carried on in this country, mainly on coal-yielding districts. It is

without the consent of that company, for no other shipping firm or company except the Hamburg-American, while the International Company has undertaken to place all orders for new ships not built in the United States with that firm.

[1] Population, Newcastle-Gateshead, 825,000.

explained elsewhere (**446**) why the making of the greatest variety of earthenware has come to be carried on mainly in the north Staffordshire district called the **Potteries**,[1] the district to which **Burslem**, **Stoke**, **Hanley**, **Newcastle-under-Lyme**, and **Etruria** belong. **Worcester** and **Derby** have long been noted for their porcelain. **Stourbridge** makes a very hard kind of stoneware from fireclay (**423·18**) found in the neighbourhood.

519. **Glass** also is made, for the same reason, chiefly on or close to the coalfields, at **St. Helens** in Lancashire, at **Birmingham**, at **Dudley** and **Stourbridge** in Worcestershire, at **South Shields**, at **Glasgow**, the glass-bottle trade at Castleford, Doncaster, Rotherham, and other places in Yorkshire. As common salt is the chief material used in the making of 'alkali' (**457**), this product is largely made in the chief **salt-yielding districts** of England. Of these by far the most important is that in the valleys of the **Weaver and Wheelock** in Cheshire, with the towns of **Northwich, Middlewich, Winsford**, and **Sandbach**, **Droitwich** and **Bromsgrove** in Worcestershire, and more recently on both sides of the Tees (Port Clarence in Durham, Middlesbrough in Yorkshire), in north Lancashire (at Preesall, near Fleetwood, and on Walney Island), at Stafford, and elsewhere. The chief seats of the **alkali works** of the country are **Widnes**, at the head of the estuary of the Mersey on the Lancashire side, and **Flint**, both near the Cheshire salt district; and works of the same kind exist on the south Durham salt district, at South Shields, St. Helens, Swansea, &c.

520. A few of the British industries in which a cheap supply of coal is of less importance than other requirements may now be noticed. In the manufacture of **paper** a supply of pure water is for the most part essential, and hence this industry is mostly carried on in **districts that still contain pure streams**. From the first introduction of paper-making into this country, the chief seats of the industry have lain in **Kent** (at Maidstone and elsewhere), and the manufacture is also largely carried on by the streams of **Derbyshire** and **Mid Lancashire** (**Darwen, Bacup, &c.**), on the Kennet in **Berkshire**, and in **Midlothian**. **Dyeing** (at least in the case of the more delicate shades) requires the same condition, and, where associated with bleaching, pure air is necessary over and above. It is hence characteristically an industry of small rather than large towns. **Perth** is the seat of some of the chief dye-works in the Kingdom; **Dumbarton, Accrington**, and Bacup carry on turkey-red dyeing. **Chair-making** is a specialty of the beech-growing districts of the Chiltern Hills, where the industry employs about 50,000 families. The making of the different parts of chairs (seats in one district where the larger trees grow, and legs and the smaller parts where only small trees grow) is carried on domestically, the parts being merely put together in the towns (chiefly **High**

[1] Aggregate population, 250,000.

Wycombe). **Sugar-refining** is carried on principally at three seaports—London, Liverpool, and Greenock.

521. The making of **shoes** is the leading industry in **Northampton**, and is among those of **Leicester** and **Stafford**; that of **gloves** is carried on at a great many small towns in agricultural districts, where labour is cheap, as at **Worcester**, **Hereford**, **Woodstock** in Oxfordshire, **Taunton** and **Yeovil** in Somersetshire, Great Torrington in Devonshire, Chester, &c. The making of **hand-made lace** is an industry in a similar position, still pursued at **Honiton** in south Devon, where it has been practised since the time of Charles I., in the vale of Aylesbury in Bucks and elsewhere.

522. Seaports. On the average of the period 1884–88,[1] the ten following seaports—London, Liverpool, Hull, Glasgow, Folkestone, Leith, Newhaven, Bristol, Newcastle, and Southampton—received nearly 84 per cent. of the total value of the imports of the United Kingdom. The first four of the seaports just named are also first in the value of their exports, Liverpool, however, ranking under this head before London. Next to these four in order of the value of their exports are Grimsby, Southampton, Harwich, Goole, Cardiff, and Newcastle; and these six seaports, together with the first four, despatched on the average of the same period nearly 90 per cent. of the exports.[2]

523. First in rank among the British **seaports** still stands **LONDON**,[3] as it always has done, having received during the period mentioned 35½ per cent. of the imports in value and despatched 30 per cent. of the exports.[4] The situation at the head of ocean navigation on a river which allows ocean vessels to ascend far into the interior of the kingdom, and which has its mouth directly opposite another great estuary—that of the Scheldt—and nearly opposite the mouth of the Rhine, gives it a commanding position for continental trade. It is these two circumstances which determined its early growth, and hence indirectly made it the capital of the country, a position which favoured its further increase in population and wealth more and more as the British Empire extended. It thus became ultimately the greatest import market of the world, a fact which of necessity greatly promoted its *entrepôt* and transhipment trade, especially since so much of that trade, on the export side, is carried on with the neighbouring continental countries. More than 50 per cent. of that characteristic trade of the United Kingdom is carried on at this port. The enormous local market, together with the facilities for redistribution both by land

[1] In 1906 the order was London, Liverpool, Hull, Manchester, Harwich, Glasgow, Leith, Newhaven, Folkestone, Southampton.

[2] In 1906 the order was Liverpool, London, Glasgow, Hull, Southampton, Manchester, Grimsby, Cardiff, Tyne Ports, Goole.

[3] Population, County and City of London, upwards of 4,500,000; of 'Greater London'—that is, of the London Police Districts—upwards of 6,500,000.

[4] In 1901-05, 32 per cent. of the imports, 26 per cent. of the exports (20 per cent. of those of British and Irish origin).

and sea, are no doubt the circumstances that have made London the one great port, not only for such Eastern products as tea and spices, but also for coffee and cocoa, and it is no doubt the latter circumstance—the ease of redistribution, as well as collection—that has been the determining factor in making London the chief centre for Australian trade. The Tilbury Docks, opened in 1886, are the deepest docks of the port, 38 feet; and they have 54½ acres of water-space, with 5,230 yards of quayage. Of late years increasing difficulty has been felt in meeting the requirements of the enormous shipping of this port, and the complaints of shippers led to the appointment in June, 1900, of a royal commission to inquire into the whole question. In a report issued in 1902[1] the Commissioners unanimously recommended that several millions sterling should be spent on the improvement of the river channels and docks, and that in order that such necessary improvements might be carried out and also an improved and less expensive administration brought about, there should be established, in place of the three different bodies at present controlling the port, a single authority to control the whole port, defined as extending from the tidal limit of the river at Teddington Lock to a line joining Havengore Creek in Essex to Warden Point in the Isle of Sheppey (and thus including, as at present, Queenborough). This authority, it was urged, should acquire, not only all the docks of importance, but also the warehouses belonging to them.

524. **LIVERPOOL**[2] has risen to a high rank among the seaports of the world only within the last two hundred years. Early in the eighteenth century it was a small place; its chief trade was with Ireland, and in that trade it had rivals in Preston and Chester, which were equally well suited for the small ships then in use. Its importance rose with the development of the cotton, woollen, and other manufactures of its hinderland, which may be said to include the whole of the industrial area from the Ribble to the north of Warwickshire and even for the bulk of oceanic traffic that lying to the east of the Pennine Chain in the West Riding of Yorkshire. The inadequacy of the ports at the mouths of the Ribble, Dee, and even the Severn, prevents them from offering in the meantime any serious rivalry. Since 1894, however, its hinderland has been encroached on by the port of Manchester, some effects of whose rivalry are shown in note 4, p. 236. Though the Mersey, as a mere harbour, is capacious enough to admit all the fleets of the world, the building of docks and quays has been necessary for

[1] Cd. 1151. The Thames Conservancy Board is now (1906) engaged in dredging a channel thirty feet deep at low water and 1,000 wide from the Nore to Gravesend, and proposes afterwards to proceed systematically with the dredging of a channel from Gravesend upwards.

[2] Population, including Bootle, about 750,000, and including Birkenhead-Wallasey, which since the completion of the tunnel under the Mersey may be fairly regarded as forming geographically part of Liverpool, above 900,000; and even this does not include some large urban areas lying just outside the municipal boundary of Liverpool.

commerce, and the six or seven miles of continuous docks on the Liverpool side of the Mersey present a sight unparalleled elsewhere. The port of Liverpool also includes the docks on the Cheshire side of the Mersey at **Birkenhead.** **The aggregate water-space of these docks is nearly 1,612 acres** (1,106 acres on the Liverpool, 506 acres on the Birkenhead side), and the length of quays is 35 miles. By the purchase of 340 acres of land, provision has been made for the extension of the docks on the north. A sandbank at the mouth of the Mersey, which formerly prevented the entrance of large vessels at low tide, has been dredged to a depth of 27 feet at dead low water.

525. HULL,[1] lying as it does on the east or continental side of the island, is one of the older ports of England, though its antiquity does not reach back to Roman times. It is said to have been founded by King Edward I., who here built a town, which was called King's town. Hence the full name of the town, Kingston-upon-Hull, Hull being properly the name of a small river which enters the Humber at the place where the town stands. It still retains a large trade in fish, which had 'strangely enriched the town' in Camden's time, but this commodity is now greatly exceeded by many other items in its very varied commerce. Its chief trade continues to be with the continent of Europe, and especially with Hamburg and Bremen. **Grimsby,** on the Lincolnshire coast, has a similar trade.

526. GLASGOW,[2] now the fourth port in the kingdom in respect of the total value of its imports and exports, has had a history in many respects similar to that of Liverpool. It has risen into importance only with the development of the New World and modern manufacturing industry, and the accommodation that it affords for mercantile shipping has had to be provided artificially to even a greater extent than in the Mersey. Its first lucrative trans-oceanic trade was with the southern 'plantations' of North America and the West Indies, whence tobacco and sugar, then much more valuable commodities than they are now, were imported. This trade began in 1718, when the first Glasgow vessel (of 60 tons burden) crossed the Atlantic, and in the course of the next fifty years Glasgow beat all its English rivals in the tobacco trade. The **Clyde,** however, was then but a small river. **Little more than a hundred years ago it was still fordable twelve miles below Glasgow.** Then came the modern inventions which made coal and iron so all-important, and the fact that these minerals are found together in the immediate vicinity of Glasgow made it worth while to convert the river into 'a great channel of the sea, bearing on its waters the ships of all nations, and of the deepest draught.' The tidal docks on the lower harbour have a depth of from 27 to 31 feet at high water, and the total length of quayage belonging to the port is 6½ miles. Glasgow, at the same time, is a great manu-

[1] Population, about 250,000.
[2] Population, 760,000; including suburbs, above 900,000.

facturing town, surrounded by smaller ones, but the industries carried on there are so varied that none can be singled out as specially characteristic, except the shipbuilding of the Clyde. **Greenock**, the only other port of any consequence on the Clyde, has a comparatively small export trade, and the only commodities imported by it in great quantity are raw sugar, which is refined in the town, and iron ore.

527. **SOUTHAMPTON**, the chief commercial port on the south coast, is one whose commerce and shipping, like those of the other southern ports, reach back to an early date. A Roman station existed on the small tongue of land between the Itchen and Test, on which the town is situated. In 1891 its docks, which now afford accommodation alongside of the quay walls for the largest ships yet built, were acquired by the London and South-Western Railway Company, and since then, according to the statement in the Report of the Royal Commission on the Port of London (pp. 18, 19), its shipping has increased at a more rapid rate than that of any other leading British port. Its position, together with its ample accommodation, makes it a convenient calling-place for continental liners, a trade likely to develop considerably in the future. It is the only port, besides London, on the south or south-east of England that has an export trade exceeding 2 per cent. of the total value of the export trade of the United Kingdom, its trade under this head being fairly representative of British export trade generally. With it may be contrasted **Harwich, Dover, Folkestone**, and **Newhaven**, all packet-stations in connection with different railway companies, and all having a large import trade very similar in character, but a relatively small export trade. The imports are largely made up of perishable articles, such as butter, eggs, fresh meat, poultry, fish, fruit, and of manufactured articles of relatively high value in proportion to their bulk, such as silks, woollens, gloves, watches, and parts of watches. Silks make up more than half the value of the imports at Folkestone, nearly 80 per cent. of those of Newhaven. Folkestone and Dover together admit all but a small fraction of the watches and parts thereof imported into this country. A large import of cotton manufactures at Harwich is no doubt accounted for by the fact that Swiss embroideries take this route into England. Of all these ports Harwich is the only one with an export exceeding 1 per cent. of the total value of the exports of the United Kingdom. **BRISTOL**[1] is the only western seaport noted in the early commerce of England (529*a*). Owing to the shallowness of the upper part of the estuary of the Severn, it served as an outlet not only for the populous region immediately to the east of it, but also for the Severn valley, and after the settlement of the New World it was one of the first seaports to secure a large share of the trade in tobacco and sugar. At the present day its import trade continues large, but its exports are comparatively insignificant. Its

[1] Population, 330,000.

development has been retarded by the inadequacy of the Avon to meet the requirements of large modern ships. A dock with a depth of 28 feet on the sill at high-water neap tides, opened in 1877 at Avonmouth, enlarged the accommodation of the port; but this did not prove enough, and in March, 1902, the first sod was cut in the construction of a new dock 30 acres in extent, intended to admit the largest passenger liners yet built. At the opposite (southern) mouth of the Avon the Portishead dock, 12 acres in extent, has a depth of 24 feet at neap tides. Considering the position of the port one might expect that, with sufficient shipping accommodation, it ought to carry on not merely a large passenger traffic, but to serve, in a large measure, as the port for the southern midlands. As to **Cardiff**, see par. 515.

528. **Leith** owes its importance to being the port of **EDINBURGH.**[1] It has an import trade in many respects similar to that of Hull, but serves (along with Grangemouth) in an even higher ratio than Hull as an inlet for sugar, butter, cheese, eggs and other continental produce destined for the populous districts in the west. The exports are comparatively small—larger, however, than at Bristol, seeing that some of the products of the west come here for export to the continent.

529. The direct foreign trade of all **Irish ports** is small, and especially under the head of exports. **DUBLIN,**[2] **BELFAST,**[3] **Cork, Waterford, Limerick,** and **Londonderry** all import directly considerable quantities of wheat and maize; Belfast also of flax; but no Irish port has exports of native origin to foreign countries amounting to one million sterling in value. Even the linens of Belfast are sent to the United States and elsewhere mainly by way of Liverpool and Glasgow. On the other hand, the Irish ports carry on a large trade with Liverpool, Glasgow, Fleetwood, Milford Haven, and other British ports, to which they send cattle, swine, butter, and other native produce, and whence they receive British and foreign commodities.

529*a*. In early times and throughout the middle ages the great feature of English trade was the export of raw materials and the import of manufactured articles. By far the most important of the exported raw materials was wool, but it was only one of several the export duties levied on which furnished a large part of the revenue of the crown. With the obvious intention of facilitating the collection of this revenue the regulation of this trade was attempted in the reign of Edward I., and the trade was more definitely organised by an ordinance of Edward III. in 1353. Therein the only staple commodities enumerated are wool, wool-fells (that is, sheep-skins with the wool on), leather or hides, and tin, but on other occasions lead, cheese, butter, alum, tallow, and worsted are also mentioned—the last, however, very seldom. The ordinance decreed that all these commodities should when exported be taken exclusively to certain English, Welsh, and

[1] Joint population Edinburgh and Leith, about 400,000.
[2] Population, nearly 300,000. [3] Population, 350,000.

Irish ports, where the duties were collected. The English ports included all those of any consideration on the east coast except Berwick-upon-Tweed, also Southampton and Exeter on the south coast, and Bristol on the west. The reason for the exception of Berwick-upon-Tweed from the list of English ports probably was that if it had been included under the regulations of the staple, English wool would have been smuggled across the Scottish border and exported from some Scottish port. Sometimes Newcastle also was omitted from the staple towns. Carmarthen was the sole staple port for Wales. In Ireland there were four: Dublin, Waterford, Cork, and Drogheda. No external staple port was mentioned, although there had been a staple abroad at various ports in the Low Countries at previous dates, and subsequently it was again found convenient to fix upon some external port as the one place beyond the seas to which all staple commodities should first be sent. From near the end of the fourteenth century till 1558 Calais was the sole external staple, but when the English lost Calais in that year the staple was transferred to Bruges. The trade in the staple commodities was mainly, but for one reason or another not at all times solely, in the hands of a privileged body known as the Staplers, who had a court of their own at Calais. The Staplers were mostly foreigners, and indeed several ordinances, including that of 1353, absolutely prohibited the trade in staple commodities to Englishmen, these being liable to smaller dues than foreigners. The loss that the revenue thereby incurred was one that the kings could not always afford, and one that was occasionally more than made good by the granting of special licenses to Englishmen to engage in the staple trade even when there was a general prohibition. Such licenses were of course obtained only on conditions that were advantageous to the crown. Among the foreigners engaged in the staple trade of England were many Italians, but members of the Hanseatic League (595*c*) were still more conspicuous. The merchants belonging to this league had gained special privileges in the foreign trade of England before the close of the thirteenth century. In what was known as the Steelyard in London on the Thames,[1] they had a well-protected residence with warehouses, and they had similar residences at some other English ports. Their privileges were for the most part maintained till 1598, when they were finally withdrawn by Queen Elizabeth.

529*b*. Long before this, however, the trade of native English merchants had been growing through the efforts of an organised company known as the Merchant Adventurers. The name of adventurers was given to those who traded in commodities not embraced by the regulations of the staple. English grain and honey could thus be freely exported to Norway and other parts in which such commodities found a market; but as English manufactures grew

[1] The site is now partly occupied by Cannon Street Station.

(217–18) these became the most valuable commodities outside of the staple. Woollens accordingly came to be the chief wares whose sale abroad was pushed by the adventurers. When this body became a regularly organised society is uncertain, but in 1404 a charter was conferred upon it by Henry IV., and shortly after the company was enabled to establish its headquarters at Antwerp. Other charters were subsequently conferred upon it, and it grew to be an extremely influential body in the sixteenth and seventeenth centuries. Its headquarters were ultimately transferred to Hamburg, on which account it became known as the Hamburgh Company, but though its chief seat was thus abroad the membership was absolutely restricted to Englishmen. In later days its special domain was all that part of the North Sea coast which lies between the Straits of Dover and the north of Denmark. It became, however, the parent or the model of several other merchant companies, which claimed, if they did not always enjoy, monopolies of trade elsewhere. Sebastian Cabot, who with his father John Cabot, had made the first voyage from England to America in the search for a north-west passage to India in 1497, lived long enough to suggest to the Merchant Adventurers in the middle of the following century a voyage in search of a north-east passage to the same destination. The voyage was actually made in 1553 under Willoughby and Chancellor and led to the discovery of a route to the White Sea and the mouth of the Northern Dvina. In the same year a company known as the Muscovy Company received a charter conferring upon it privileges in the trade with Russia and Persia. In 1579 the Eastland Company obtained its first charter conferring privileges in connection with Scandinavian and Baltic trade. Afterwards the Levant or Turkey, the East India, and the Africa or Guinea companies were successively founded. The most important of these for the future of England was of course the East India Company, which obtained its first charter on the last day of 1600, and subsequently to the implicit annulment in the Declaration of Rights in 1689 of all royal monopolies of trade, had a monopoly of the eastern trade expressly conferred upon it by Parliament. This monopoly was retained for India till 1813 and for China till 1833. By this date the Company had become a great territorial power, and from 1833 it was nothing else. As to the Hudson Bay Company, see par. 353.

529c. Meanwhile the nature of English trade had completely changed. English manufactures had long been the principal exports. Throughout the eighteenth century woollens were the most important of these, and so jealously was any rivalry in this trade regarded that every effort was made to check the rise of a similar industry in Ireland. In the course of the eighteenth century cotton goods came to acquire more importance. They were among the goods which Bristol and other merchants carried from England to West Africa to be exchanged for slaves sold in the West Indies whence the ships

returned home with cargoes of sugar and other tropical produce, a highly lucrative trade not put an end to till the first of January 1808, when the slave trade was made illegal. At last came the revolution in industry which created a new era not merely for English commerce but for the commerce of the world, and which in England speedily had the effect of raising cotton manufactures to the first place among our exports (see pars 254–7 and par. 17 of the Introduction to the Fourth Edition).

FRANCE

530. The **area** of France, including Corsica, is about seven-tenths larger than that of the British Isles, the population somewhat smaller. The **density of population** is thus less in France than in the British Isles, but in France the population is more equally distributed.

531. Surface. The greater part of the mainland of France is made up of plains, gently rolling land, or broken hilly country offering little hindrance to communication. Lofty mountains, the **Pyrenees** (**655**) and the **Alps**, form the land frontier on the south and south-east. As yet the sole railway from France across the Alps is that which connects the valleys of the Isère and the Dora Riparia by means of the earliest of the longer Alpine tunnels, the so-called **Mont Cenis** tunnel, opened in September 1871. Even the French **Jura** and the **Vosges**, on the eastern frontier, are much higher than any British mountains, and obstruct to a considerable extent the communication with the adjoining countries. (See the railway map under the German Empire.) But the chief highlands within the French frontier are those of the so-called **Central Plateau**, which is really situated more to the south-east. These highlands have an average height of from 2,500 to 3,000 feet. On the east they are bordered by the **Cevennes**, which sink abruptly down to the Rhone valley; towards the west they are crowned by the remains of the old volcanoes (the *puys*) of Auvergne; and they are traversed by profound river valleys opening to the north and west. The climate of the surface is bleak and the soil unproductive, but this is to some extent compensated by the richness of some of the valleys. This is particularly the case with the expansion of the valley of the Allier called the **Limagne** (round Clermont), which the volcanic dust (50) blown hither by the prevailing south-west winds from the mountains of Auvergne has helped to make one of the most fertile tracts of France. Altogether, the Central Plateau is a sparsely peopled region, but even its most thinly peopled districts are to be compared rather with the less populous parts of Wales and the north of England than with the highlands of Scotland.

531*a*. The level tract between the Adour and the Garonne on the south-east, embracing the maritime downs of the **Landes**, contains even less fertile land than the Central Plateau, and here also population

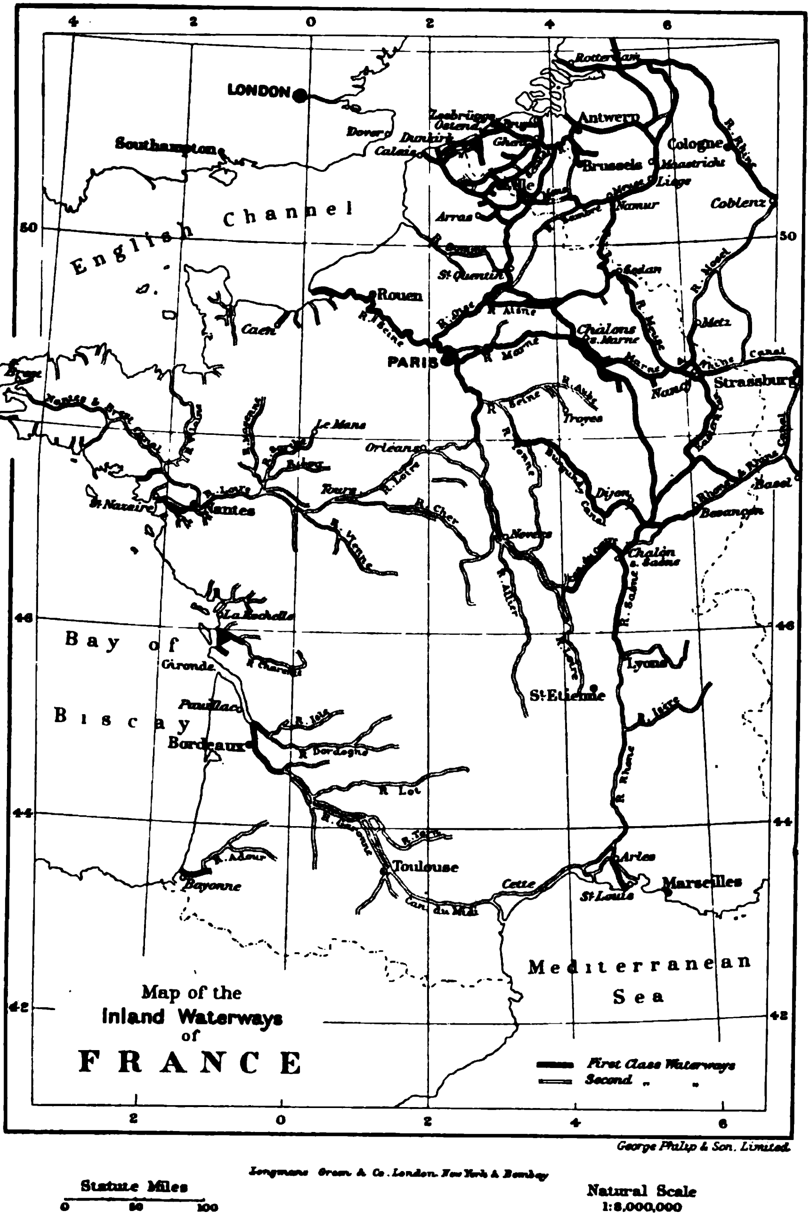
is scanty and railways are wide apart. Corsica is highly mountainous, and, like other mountainous islands, has its population chiefly on the coast.

532. Internal navigation. The rivers of France are much more important as means of internal communication than those of England. Even the shortest of its great rivers, the Dordogne, is rather longer than the Shannon, and the **Seine** (with its tributaries, the Oise, Marne, Aube, and Yonne), the **Loire, Dordogne, and Garonne**, and the **Saône**, the chief tributary of the Rhone, as well as minor rivers, flow through plains and valleys presenting few obstructions to navigation for the greater part of their course. The impetuous **Rhone**, though navigable from Lyons, has its course impeded by sandbanks and other obstructions. The importance of the navigation naturally afforded by the rivers is shown by the **canal connections** between the rivers in the east and west. The **Marne and Rhine Canal**,[1] which crosses the northern or lower end of the **Vosges** at the height of about 1,100 feet, and unites the Rhine navigation to that of the Seine, begins at a point on the Marne about 300 miles above the mouth of the Seine. The **Burgundy Canal**,[2] which connects the navigation of the Seine and Rhone by means of the Yonne and Saône, begins on the former river at a point about 275 miles above the mouth of the Seine, and ends on the latter rather more than 300 miles above the mouth of the Rhone. It crosses the Côte d'Or at the height of 1,230 feet, and passes Dijon. The **Canal du Centre**[3] connects the Loire, about 400 miles from its mouth, with a lower point on the Saône, passing to the north of the Central Plateau at a height of about 1,000 feet at the summit. The **Rhone and Rhine Canal**[4] quits the Saône near the point of entrance of the Burgundy Canal, and enters the Rhine valley through the opening known as the Burgundy Gate, between the southern end of the Vosges and the western slopes of the Jura. The **Canal du Midi**[5] connects the Garonne at Toulouse with the Mediterranean at Cette, traversing at the height of 625 feet the Passage of Naurouse, between the Central Plateau and the Pyrenees. (See 549.) The accompanying map shows the inland waterways of France as distinguished by the law of 1879, those of the first class having a minimum depth of 6½ feet, and locks of at least 126 feet in length and 17 feet in width. The chief inland navigation in France is in the north **between the basins of the Seine, Somme, and Escaut** (Scheldt), where the flatness of the surface has favoured canal construction, and where there is a large amount of heavy traffic. Inland water traffic is chiefly local, but raw cotton is now conveyed from Havre by water to the cotton-working region of the Vosges, and coal from the north is beginning to find its way to Lyons by the same means.

533. As regards **climate** France has all the advantages of a westerly

[1] 180 locks. [2] 191 locks. [3] 84 locks. [4] 157 locks. [5] 99 locks.

maritime situation, together with a more southerly latitude than the British Isles, and it is therefore to be expected that France should excel



this country, as it does, in respect of the abundance and value of its agricultural products.

534. Less than one-fifth of the surface of the country is occupied by mountains, about a fourth by plateaux. This leaves more than one-half for the lowlands, which, it is true, are not everywhere fertile (531*a*), but nevertheless contain a large proportion of fertile soil. Though the ratio of the total surface of France to that of the British Isles is only 1·7 : 1, the extent of **corn-crops** in France has in recent years been more than 3½ times as great as in the United Kingdom. The **wheat-crop** of France is **next in amount to that of the United States** among all the countries of the world for which statistics are obtainable. On the average of the ten years 1877–86 it was estimated to form nearly one-fourth of the whole wheat-crop of Europe.[1] And in addition to wheat and other British crops France produces large quantities of maize, besides the less valuable rye and buckwheat.

535. Besides corn-crops France produces **all the ordinary British green-crops**, potatoes and mangold each covering more than twice as great an area as in the British Isles; the **vine**, the most valuable of all the French crops (184), **still covers**, notwithstanding the devastations of the phylloxera, **an area as large as that occupied by wheat and barley together in the United Kingdom**; the average of **sugar-beet** greatly exceeds the British average of mangold; and large areas are occupied by **olive-yards**, **mulberries**, for the rearing of silkworms, **colza**, **hemp**, and **flax**, though the last-mentioned crop is smaller than that of Ireland. **Tobacco** is likewise a product of no little importance, though the total acreage occupied by it is less than half of that devoted to hops in England.

536. Where French agriculture is inferior to British is in the amount of produce of crops common to both countries relatively to acreage. If an acre of wheat were as productive in France as in Britain, then the total wheat crop of France would be at least 6⅓ times instead of little more than 3½ times that of the British Isles. A steady improvement in French agriculture is, however, shown by the fact that in every decennial period from 1821–30, when the average yield of wheat per acre was 13¼ bushels, there has been a rise in the average down to 1881–85, when it amounted to 18[2] bushels (141).

537. The **mineral wealth** of France is greatly inferior to that of Great Britain, and the inferiority is most serious in the case of coal. The **coalfields**, though small, and not very productive, are, however, **scattered** over different parts of the country, and the central region—that, accordingly, which is furthest from supplies of sea-borne coal—has the greatest number of centres of local supply. The **most productive coalfield is a continuation of that of Belgium**, and the **chief centre of production is Anzin** (see map, p. 281). **Next in productiveness** are those on or near the eastern side of the highlands which border the basins of the Rhone and Saône on the west—**round St. Etienne** in the

[1] Still true about 1900. See *Agric. Returns, U.K.*
[2] Later average, 19.

middle, **round Creuzot** further north, and **at Alais** in the south. The great bulk of the **iron ore** produced in France is obtained from the basin of the Moselle in the extreme north-east of the country. Other deposits are worked round Creuzot and elsewhere.[1] **Sea-salt** is obtained from salt-pans on the western Mediterranean coasts and on the coasts of the Bay of Biscay; rock-salt, near Nancy, in the north-east.

538. One consequence of the wide dispersal of the French coalfields is the fact that the localisation of the great French **manufacturing industries** is governed more by the position of local supplies of raw material and the conveniences for obtaining supplies from abroad than is observable in other countries where the supply of fuel is more concentrated.

539. PARIS,[2] the capital of the country, is, like London, too large to be specially identified with any particular industry, but is the seat of a large number, more particularly those concerned in the production of articles of luxury, such as are in greatest demand in a large capital. Jewellery and perfumery, furniture, porcelain, glove-making and the making of fashionable boots and shoes, and a great variety of fancy ware, are all notable Parisian trades. The celebrated porcelain work which gave name to Sèvres **porcelain** is now carried on at **St. Cloud**, immediately to the north of Sèvres, on the left bank of the Seine, to the west of Paris proper. The central position of Paris in the great northern plain of France, just below the junction of the Marne and Seine, has been in favour of its acquiring and retaining the rank of capital, and the fact of its being the capital and being so centrally situated makes it without a rival in the country in trade and population. The Seine has been canalised to Paris to a sufficient depth to allow of direct sea communication with London.

540. The **woollen industry** is chiefly carried on **in the north**, where there are the principal supplies of native wool, and where supplies of foreign wool are most easily obtained from the River Plate and from England by way of Dunkirk and Havre, as well as the Belgian port of Antwerp (**207, 207*a***). The **principal markets for wool** in France in the order of importance are **ROUBAIX, Tourcoing, Reims, Fourmies,** and **Amiens.** Roubaix, Tourcoing, and Fourmies are all close to the northern frontier and are most directly supplied by way of Dunkirk; Reims lies beside the sheep-pastures of Champagne, a region similar to the English downs, which has fostered a trade in wool and woollen-manufactures at Reims from a very early period. Amiens, on the Somme, is almost equally accessible from the ports of Havre and Rouen in the south and Dunkirk in the north. All these towns are also noted for their **woollen manufactures**, those of the closely adjoining towns of **Roubaix, Croix,** and **Tourcoing**[3] including carpets. **Sedan** on the Meuse, in the north-east, is another old manufacturing

[1] See p. 179, n. [2] Population, 2,660,000.
[3] Aggregate population of the three towns, about 320,000.

town engaged in the same industry, fostered by the sheep-pastures of Ardennes. **Elbeuf**, on the Seine above Rouen, and **Louviers**, a little to the south-east, are noted for their woollen (as distinguished from worsted) cloths; and **Troyes**, on the upper Seine, has long been noted as the chief seat of French **hosiery**.

541. The **silk-manufactures** still have their chief seats in the valley of the Rhone, where they first grew up in consequence of the introduction of the silkworm (232). **LYONS**[1] (*Lyon*), the third town in France in point of population, the birthplace of the inventor of the Jacquard loom (232), is the town whose name is most intimately associated with this industry in all its branches. It lies at the confluence of the Saône and Rhone, partly on the left bank of the latter river, partly on a small alluvial flat between the two, and immediately overlooked by the hills which skirt the right bank of the Saône. Next in importance to Lyons in connection with this industry is **ST. ETIENNE**, which supplies Lyons with coal. St. Etienne manufactures chiefly ribbons. Both it and Lyons have excellent water for dyeing. **Avignon**, on the Rhone below Lyons, and **Nîmes** and other towns in the valley are also engaged in the silk industry, which also employs large numbers in Paris.

542. LILLE,[2] the largest manufacturing town of the north, has linen, cotton, woollen, and other textile industries, the first-mentioned branch being favoured by the fact that the part of France to which it belongs, with the adjoining part of Belgium, produces the best flax in Europe (555). To the south-east of Lille, on the Escaut, stands **Cambrai**, which gives name to cambric.

543. In the **cotton industry** the manufacturing towns of Normandy are pre-eminent, and above all **ROUEN**. Further north the chief cotton-market is **St. Quentin**, to the south of Cambrai. **In the east**, cotton factories have been established at **Sénones**, **St. Dié**, **Epinal**, and other places west of the Vosges since the transference of the busy cotton-manufacturing district of Alsace to Germany in 1871.

544. Creuzot is specially noted for the making of machinery, locomotives, and other railway material, but such industries are also largely carried on at Paris, Lille, and other large towns. In recent years a great iron industry has been developed, chiefly by Belgian capitalists, in the iron-ore region of the north-east shown in the map on p. 281 between Longwy and Nancy. The manufacture of arms is carried on at **St. Etienne, Bourges, and Charleville**.

545. Limoges, on the Vienne, is noted for its **porcelain and earthenware**. Both coal and kaolin (444) are obtainable at no great distance, though they lie in different directions from the town. **Glass** is made on the coalfields of the north and centre; **paper** at **Angoulême** in the west, and **Annonay** in the east; watches at **Besançon** in the Jura, though the industry carried on here consists mainly in putting together parts

[1] Population, 450,000.

[2] Population, 215,000.

of watches made in the Swiss Jura. The manufacture of kid gloves is carried on in nearly every village within a radius of forty miles of Grenoble in the Alpine valley of the Isère.

546. The principal French **seaports** in the order of their importance are Marseilles, Havre, Bordeaux, Dunkirk, Rouen, St. Nazaire, Cette, Dieppe, Boulogne, Calais.

547. The priority of **MARSEILLES**,[1] distant as it is from the capital and the great northern seats of industry, is due to the fact of its being **the only first-class port belonging to the Rhone valley.** The Rhone delta itself is too marshy, the mouth of the Rhone too much encumbered by sandbanks, to have afforded a favourable situation for the rise of a port, and hence Marseilles was founded on the nearest place on the coast where nature had furnished the conditions which the delta of the Rhone denied. Ever since its foundation by a body of Greek colonists from Phocæa in Asia Minor, about 600 B.C., it has been a great seat of commerce and shipping. The Rhone valley, besides being itself rich and productive in various ways, affords access to the plains of northern France and Belgium through the valleys of the Loire and the Seine tributaries along the routes indicated by the position of the canals already named (532), to the Middle Rhine valley by the Burgundy Gate between the Vosges and Jura, to the tableland of Switzerland by way of Geneva through the narrower opening between the Jura and the Alps. The advantage of some of these connections has, however, been considerably reduced by the piercing of the Alps by railway tunnels; and especially by the construction of the St. Gothard tunnel, which gives to **Genoa (675) a shorter route to Antwerp** than that from Marseilles. And here we see one disadvantage for France in the position of the Central Plateau and the adjoining highlands to the north. The only railway that crosses the Cevennes from the Rhone valley does so in numerous tunnels and with many steep gradients, altogether by a route too costly and devious to be suitable for through traffic. The through traffic from Marseilles mainly ascends the valley of the Rhone and Saône as high as Dijon before turning northwestwards, and it is the indirectness of this route that causes Genoa to have the advantage over Marseilles which it now possesses for transit trade. Within France, however, there is no railway route on which the gross receipts per mile are so great as on that from Marseilles to Paris.

548. The position of Marseilles causes its trade to be chiefly with the Mediterranean and the East, and this is one of the ports benefited by the opening of the Suez Canal (697). Among its chief imports are wine from Italy and Spain, wheat, oil-seeds, sugar, coffee, pepper, and other Eastern products. Among its local **industries** may be mentioned particularly the **refining** of oil and the making of soap, stimulated by the local supplies of olives, and the import of olives from Italy and of

[1] Population, 500,000.

various oil-seeds from India and the East generally, as well as from Africa. There is also a large manufacture of maccaroni from hard wheat imported from Italy. Marseilles is the headquarters of the great steamship company known as the *Messageries Maritimes*, which carries on an extensive commerce with the East and the Pacific.

549. **Cette**, on the west of the Gulf of Lions, has mainly a local importance through being the **terminus of the Canal du Midi.** Even this importance has been threatened by the serious consideration of an old project for the construction of a ship-canal from Bordeaux to the Mediterranean by **Narbonne** (south-west of Cette). This canal, 330 miles in length, would effect a gain of 1,350 miles on the ocean route round Spain and Portugal.[1]

549*a*. At present **Marseilles** is without a rival on the Mediterranean, but it was not so in the Middle Ages, when ships were smaller and some French Mediterranean ports existed which are no longer accessible. Even then Marseilles ranked first, but the ships of **Arles** on the Rhone were to be seen side by side with those of Marseilles in the most distant parts of the Mediterranean. **Narbonne** continued to be an important port till the fourteenth century, and **Aigues Mortes**, in virtue of a canal connecting it with the sea, was once a great resort of maritime shipping, and lingered on as a seaport till **Cette** was fixed upon as the eastern terminus of the Canal du Midi, which was opened in 1681. Then the efforts to fight against the deposits of sand and silt ceaselessly brought by currents with a westerly set to the Languedoc coasts of the Mediterranean were abandoned, and Aigues Mortes was allowed to fall into decay. The port of Cette requires constant attention to preserve it from the same fate.

550. The commerce of France on the **western and north-western coasts** is in the aggregate much greater than that on the Mediterranean, but is divided among a greater number of large seaports. **HAVRE**, or Le Havre, at the mouth of the Seine, founded in 1509 by Louis XII., has grown to be 'the haven' of Paris since its harbour was extended and improved by his successor Francis I., and since the elder seaport of **Harfleur**, a little higher up, declined through the silting up of its harbour. It is the chief seat of trade with America, and hence the chief place of import of North American cotton, tobacco, wheat, animal produce, &c., and one of the chief places of import of South American wool. Since 1887 the Tancarville Canal has afforded direct communication between the port of Havre and the Seine, thus enabling smaller vessels to avoid the dangerous navigation of the estuary of the Seine. **Rouen** has since the same date taken away some of the trade of Havre, the Seine having been deepened and straightened up to that port, where vessels drawing as much as 22 feet can lie afloat alongside parts of the quays.

550*a*. In the north it has latterly been exposed to the keen rivalry

[1] This project is now (1903) laid aside.

of **Dunkirk**, the only French port on the North Sea, a port which in **recent years** has been **the most rapidly rising of all French ports**, in consequence of its being so favourably situated for the supply of the northern manufacturing towns with their imported raw materials (above all South American wool), and for the export of their manufactured products, including iron, beetroot-sugar, and oils. Its harbour can easily be entered at spring-tides by vessels drawing 28 feet, and even at neaps by those of 25-feet draught.

550*b*. BORDEAUX,[1] on the Garonne, a little above the place where the estuary of the Gironde is formed by the confluence of the Dordogne, has long been the chief place of export of French wines. For vessels of the largest class it has an out-port in **Pauillac**, on the left bank of the Gironde (**107**), but at spring-tides vessels drawing as much as 24 feet can come up to Bordeaux itself, and at all times vessels of 20 feet draught. **St. Nazaire**, at the mouth of the Loire, has, like Pauillac, grown in importance through the introduction of large shipping, and also through the silting up of the Loire at **NANTES**. It is capable of accommodating ships of the largest size, but Nantes, after being almost closed to sea-going vessels, has been restored to the position of a considerable seaport by the construction of a ship canal admitting vessels up to a draught of 20 to 21 feet.

551. The five **naval stations** of France are **Cherbourg**, on the English Channel, nearly opposite Portsmouth; **Brest** and **Lorient**, in Brittany; **Rochefort**, on the Bay of Biscay; and **Toulon**, on the Mediterranean. At all of these there are government dockyards, and there are private shipbuilding yards at all the chief commercial ports.

552. Of the inland towns of France not connected with any special industry the most worthy of mention are **TOULOUSE**, on the Garonne, at the confluence of the Canal du Midi (**532**); **Orléans** and **Tours**, on the Loire; **Angers**, at the confluence of the Mayenne and Sarthe. **Dijon** and **Macon** are important centres of the trade in burgundy wine, **Reims** and **Épernay** of that in champagne.

[1] Population, above 250,000.

BELGIUM

553. The **surface of** Belgium is made up of a **tableland intersected** by deep river valleys in the south-east, sloping down to low flat plains, partly below sea-level, in the north and west. The plains afford admirable facilities for **inland navigation both by river and canal** (96, 532); and even the **Meuse**, which traverses the tableland, is navigable to beyond the Belgian frontier.

554. The **high density of population** is pretty uniformly distributed over the greater part of the country. Only the province of Luxemburg, in the south-east, on the tableland of the Ardennes, has a density of population low enough to be compared with that of the English county of Hereford. Another district of low density is that called the **Campine**, on the north-east—a sandy plain, formerly heathy or marshy, but now reclaimed, and producing excellent butter—the best, it is said, in Belgium. This high density of population is due, as in England, **both to advanced agriculture and to the great development of manufacturing industries**, the latter being favoured by abundance of the minerals most essential to modern manufactures, as well as by admirable facilities for transmarine and inland commerce. Two languages are spoken by the bulk of the population—Flemish by those living north of a line drawn from the south of the province of West Flanders to the north of that of Liège, French by those to the south of the line. In a small district in the south-east the language is German.

555. **Three-fourths of the surface are in crops, bare fallow, and grasses**, the principal crops being **wheat, rye, and oats.** Wheat, including spelt, usually occupies about 11 per cent. of the surface, as against 18 per cent. in England; rye covers fully as large an area, and oats nearly as much. Among the minor crops are beet, including sugar-beet, buck-wheat, and flax. **Flax is grown mainly in the district drained by the Lys**, a left-bank tributary of the Escaut, and the fibre obtained from it has long been known for its excellent quality, which is due to the circumstance that the district named is remarkably free from lime salts, in consequence of which the water of the Lys is peculiarly well suited for the cleansing of the fibre. The centre of the trade in this commodity is **Courtrai.**

556. At the last agricultural census of Belgium 86 per cent. of the

surface in cultivation was cultivated by the owners themselves. Most of the landed properties are small, but small farming is even more general than small property-holding, the size of the majority of the holdings being about as small as those on the plains of Bengal (733). The productiveness is greater than in France (141), and this is not due to natural fertility, except in the rich polders or embanked areas reclaimed from the sea.

557. The **mineral wealth** of Belgium consists chiefly in coal, iron, and zinc. The place which this country holds relatively to others in the production of these is indicated elsewhere (376, 397, 419). The **region of production**[1] may be described as occupying the valleys which intersect the Belgian plateau from the eastern frontier near Aix-la-Chapelle to about the middle of the Franco-Belgian frontier, the principal valleys in this respect being those of the Sambre and Meuse, more especially that part of the Meuse valley which continues the line of the valley of the Sambre. Geologically, this strip is formed by a series of carboniferous strata lying on the north-western margin of a Devonian plateau which extends eastwards into Germany. The carboniferous area is occupied by a large proportion of productive coal-fields, the chief coal-mining regions being **round Mons**, in Hainaut, near the French frontier, and **round Charleroi** in eastern Hainaut. Coal was discovered in 1901 at **Lanaeken** in Limburg, below the Dutch town of Maastricht, at a depth of about 1,770 feet.[2] **Iron ores** are chiefly found in the more easterly provinces of **Namur** and **Liège**, and zinc is obtained at Moresnet, close to the eastern frontier between Verviers and Aix. There are also productive lead-mines near Verviers. The iron ore production in Belgium is only about one-tenth of the amount consumed. This deficiency is, however, of less moment on account of the proximity of the very abundant iron ores of the grand-duchy of Luxemburg (570) and the north-east of France (537).

558. The **manufactures** stimulated by the existence of this mineral wealth are numerous and varied, and it is worthy of notice that the **textile** manufactures which predominate are those which are likewise favoured by local supplies of raw material, namely **linen** and **woollen**. The tables of Belgian exports in the Appendix show that linen and woollen yarns are the chief special exports that may be classed under this head, and the former branch is fostered by the advantages for flax-growing already referred to, the latter by the sheep-pastures of the Ardennes (540), as well as by the large supplies of wool obtained from the River Plate (207). The spinning and weaving of linen are carried on chiefly at Ghent, **Tournai**, **Courtrai**, and other western towns (in Flanders) in or near the flax-growing region; but the linens of Courtrai are not made with the fine fibre of native production, but of coarser material imported from Russia. The town most noted for its

[1] See map, p. 281. [2] See Introd. to 8th ed., par. 48*b*.

woollen cloth is **Verviers** (Liège), which lies close to the Ardennes and the coal-supplies of Liège. **GHENT** is the centre of the **cotton**-manufactures. **BRUSSELS**,[1] the capital of the country, has numerous industries, but is not specially a manufacturing town, though it may be here mentioned on account of its lace.

558*a*. Verviers presents a remarkable instance of the persistence of an old industry, its woollens having been noted as far back as 1482. It also exports very large quantities of woollen yarn, or a hybrid between woollen and worsted yarn (**214**), and of washed wool, the last branch of the industry being due to a local advantage turned to account by science and common sense. A committee having ascertained that the presence of lime in water is prejudicial to the scouring of wool, a dam was constructed across a small stream in the neighbourhood which flows over slate and sandstone, and the water of which is free from the noxious ingredient. By that means an abundant supply of suitable water was obtained.

559. Next in rank to textile manufactures in the aggregate among Belgian mechanical industries stand those connected with the working of iron. Among these the making of **machinery** is first in importance, and the chief seat of this branch is **LIÈGE** with its suburb of **Seraing**. Liège itself is one of the most important seats of the manufacture of firearms in the world.

559*a*. The situation of Liège is highly characteristic of the eastern towns of Belgium generally. The antiquity of the place is shown by the fact of its having been known to the Romans under the name of *Lugdunum Batavorum*, and during its whole history it has been an important centre of trade. This ancient importance is explained by the features of the surrounding country. Liège lies, like Namur, Verviers, Huy, and other important towns in the east of Belgium, in a narrow valley of the south-eastern plateau. It lies, however, just where the valley of the Meuse, to which it belongs, begins to open out on the left so as to afford free communication in various directions towards the west and north, and where also the valley of the Ourthe opens a way to the south through Belgian Luxemburg, and that of the Vesare, eastwards by way of Verviers and Aix-la-Chapelle to the Rhine. **Its position may hence be compared with that of Manchester and Leeds**, and all the more nowadays, when the mineral wealth of the neighbourhood is so important (**507*a***, **508*a***).

560. The **glass-works** of Belgium (**454**) lie mainly on the coalfields which have also given rise to extensive potteries, chemical works, &c.

561. The **industry**[2] and commerce of Belgium being in many re

[1] Population, including suburbs, 530,000.

[2] An industrial census of Belgium was taken in October 1896. From this it appears that 690,000 persons were employed at that date in factories, workshops, mines, &c., the male and female employees being in the ratio of about 5 to 1. In the weaving of cotton and woollen fabrics 46 per cent. of the employees were still engaged on hand-looms, and in linen weaving 61 per cent; in the hosiery trade

spects similar to those of the United Kingdom, a comparison of the tables in the Appendix showing the trade of these countries is instructive. In the export tables the same upward tendency will be observed in both under the head of machinery[1]; in both will be noticed a sudden spurt in the period 1881–85, but the advance in Belgium in that period is relatively smaller than in the United Kingdom (29·4 against 56·6 per cent.). Under the head of wrought-iron &c. Belgium does not keep pace with the United Kingdom, and under that of coal it is decidedly losing ground, notwithstanding that the chief market of the former lies just beyond the southern frontier. On the other hand, Belgium shows a steady advance in the export of linen and hemp (chiefly linen) yarn, against a steady decline during the last four periods in the United Kingdom; and under the head of woollen yarn, the position of Belgium has been maintained better than that of the United Kingdom—a fact which is partly accounted for by the circumstance that the chief market for such yarns is on the continent of Europe. In the import tables of the two countries now under comparison, the most striking fact is that in both grain has come to occupy the first place on the list, but in the case of Belgium it is to be noted that the large import is partly counterbalanced by a large export of grain.

562. For the distribution of the products of its industry, and the reception of products of other countries, no country on the European mainland has greater natural advantages than Belgium, among which may be mentioned this, that the extreme flatness of a large part of the country enables even the roads to compete with the railways. At Liège may often be seen laden wagons from Brussels, which is sixty miles, or from Antwerp, which is seventy-two miles distant. Horse and steam tramways, as feeders of the railways, are numerous. On the land side, Belgium lies close to some of the most populous parts of the surrounding countries, and in Antwerp it possesses a seaport vying in situation with that of London (523).

563. Like London, **ANTWERP**[2] lies on a tidal river, the Scheldt, at the head of a deep estuary. It stands on the right bank of the river, and is strongly fortified. It has the advantage over London of having a much more complete system of inland navigation subsidiary to its transmarine commerce, so that in 1887, when the total tonnage of the marine shipping entered and cleared approached 4,000,000 tons in either direction, the tonnage of inland navigation that arrived and the tonnage that departed both exceeded 2,500,000 tons. From the map on p. 257

less than 6 per cent., and in the boot trade less than 3 per cent., of the employees worked with the aid of power-driven machines. Nearly half the coal-miners worked between 9 and 10 hours a day, and in other industries only one-tenth of the work-people had a working day of less than 10 hours. See the abstract of this census in *Econ. Journ.*, 1902, p. 530.

[1] In the last period (1896–99) the only advances shown by Belgium are in coal, glass, and hides.

[2] Population, including suburbs, nearly 350,000.

it will be seen that this port is connected by first-class waterways with the Meuse, Seine, and Rhine, this last being reached by the channels between the islands of Zeeland. Barges of 800 tons can reach and ascend the Meuse. In former days Antwerp reached the height of its prosperity in the sixteenth century. It afterwards declined from political causes, but since the navigation of the Scheldt was made free in 1863 it has once more risen to a high rank among continental seaports, and for a time outstript its Dutch rival, Rotterdam. Its further progress is impeded, however, by the difficulty of the navigation of the eleven miles of the Scheldt immediately below the port,[1] but these difficulties are not of such a nature as to prevent large ocean liners from reaching on a rising tide the excellent quays alongside the river, where ships of 28- to 30-feet draught can be accommodated. (See also **495 and 567*a*.**)

564. GHENT,[2] at the confluence of the Lys and Scheldt, was made a seaport in the modern sense in 1886 by means of a ship canal from the estuary of the Scheldt at Terneuzen, admitting vessels of 2,500 tons burden (17½ feet draught). By the year 1908 this canal is expected to be made available for ships drawing 26–27 feet. **Ostend,** which lies amongst the downs on the south-west, is the only other Belgian seaport of importance; but **Bruges,**[2] one of the older rivals of Antwerp, is likely now to revive as a seaport, since the opening, in 1900, of a canal to the sea with a depth of 26 feet 8 inches. Its new outport, Zeebrügge, is to have a harbour capable of admitting at one time twenty-one of the largest Atlantic liners.[3]

[1] On the lower part of this stretch great improvements have been made by the Belgian Government, and projects for improving the upper part are now (1910) in progress. The usual depth of the Scheldt at ordinary low water below Antwerp is 23 feet, at ordinary high tide 37 feet. There is now in construction immediately below Antwerp a basin or blind canal about five miles long, with a depth of 39 feet, and nine open transverse docks of the same depth running out of it, connected with the right bank of the Scheldt by large locks with a depth of 26 feet at low water. An additional proposal is to divert the Scheldt from its present bed, in which it makes a great bend to the west, into a new bed connecting the present course of the river at Antwerp by a gentle curve with the upper part of the next bend to the right close to the proposed locks. This latter proposal is, however, strongly opposed by some who fear that the port will thereby become closed to shipping through the accumulation of uncontrollable masses of silt, which, it is contended, would be swept on unchecked until the river was compelled to slacken its course where its bed widens immediately below the proposed cut.

[2] See also below, par. 567*a*.

[3] With regard to the transit trade of Belgium see par. **600*b*** (p. 295), par. **607*a*** (p. 300), p. 309*n*, p. 340 *n*. 1, and p. 602.

HOLLAND, OR THE NETHERLANDS

565. The kingdom of the Netherlands proper, that is, the state that lies to the north of Belgium, is mainly an agricultural and commercial country. It has **no highland region**, and none of the **mineral wealth** that characterises the highland region of Belgium. In the eastern provinces of Drenthe, Overijssel, and Gelderland a large part of the surface is marshy and occupied by **peat moors**, which considerably reduces the area available for crops and pastures. The whole extent of land capable of being so utilised is little more than three-fifths of the entire area; but, on the other hand, **a large part of** the agricultural region is of very **exceptional fertility**. This is especially the case with those parts, chiefly in the provinces of Zeeland and Holland proper, which lie below the level of the sea and have been regained from the sea by centuries of labour. From the nature of the case these tracts can have no natural drainage, and there are other extensive areas which, though above sea-level, yet lie so low that they cannot be drained by ordinary means. Hence **polders**—that is, enclosures surrounded by dykes or embankments and provided with pumping-machinery—form the characteristic scenery of the most populous parts of the country. The soil of such areas is naturally moist, and thus best fitted for rich **pasture grasses**, so that horses and cattle are very numerous, and the cattle yield abundance of **milk**. Hence it is that **butter** takes so high a place among the special exports of Holland, and that **cheese** also is an important Dutch commodity. The western provinces above mentioned, together with the northern province of Friesland, are those which are most noted under this head.

The other crops of Holland are similar to those of Belgium, even sugar-beet and tobacco being among the number, though the latter occupies a very limited extent of ground.

566. In **manufacturing industry** Holland formerly had a high reputation. The absence of minerals, however, is adverse to the carrying on of manufactures by machinery. Nevertheless, cotton, linen, and woollen spinning and weaving by modern methods are all largely pursued. The chief **cotton and linen manufacturing** towns of Holland, **Enschede, Almelo, Hengelo, &c.**, are situated in the south-east of the province of Overijssel, where the cotton industry was established before the close of the eighteenth century. Linen manufactures and

many others are carried on at **Tilburg**, in North Brabant. A great variety of textile and other manufactures are carried on at **UTRECHT**. **Delft** still retains manufactures of earthenware, for which it was once famous.

567. In foreign commerce Holland has stood in the front rank of nations from the very beginning of its separate existence, and among the facilities for foreign commerce the **waterways**, natural and artificial, have greater importance in Holland than in any other European country. In 1900 the length of river and canal navigation was nearly twice as great as the length of railways. (See 96.)

567*a*. It may be convenient to consider here the commercial development more particularly of the maritime provinces both of the modern Belgium and the kingdom of the Netherlands, inasmuch as the same geographical conditions have in a large measure affected those of both countries. The waterways of the Rhine, the Meuse, and the Scheldt have at all times given to the ships of these provinces access to the interior of important parts of the continent. Most important was the Rhine with the Rhine valley which, where the river itself in past times was not navigable, has been used as a highway into the interior of Europe from prehistoric times downwards. The towns that first rose to high commercial importance in this region were the Flemish ports of **Bruges** and **Ghent**. For this there seem to have been from the first two chief reasons. First, the northern ports more directly connected with the Rhine lay in a district where much reclamation of land had to be done before a large population could grow up. Second, the ports just named were nearer the centres of influence of the old Roman civilisation, which still survived and continued to be propagated in spite of the convulsions by which the empire had been overthrown. **Arras**, now in the French department of Pas-de-Calais, was the focus of civilisation for the whole of northern Flanders.[1] That the navigation of the Rhine was of importance to the Flemish towns at an early date is shown by a record of the year 1178, in which reference is made to an already long-existing right of commerce on that river even above Cologne enjoyed by the people of Ghent. At an early date also the vicinity of the Flemish ports to England was a matter of great importance, and particularly during the period when so much English wool was wrought up in Flemish towns (thirteenth to the fifteenth century). During this period Bruges had the advantage of possessing a great harbour at the head of the Zwin channel, which then ran due north to the estuary of the Scheldt. With the same harbour Ghent was connected by canal (after the middle of the thirteenth century) at an even earlier date than the connection with Terneuzen was established (first after 1829). **Antwerp** rose into importance later than Bruges and Ghent. Physical changes first established its communication with

[1] Warnkoenig, *Hist. de la Flandre*, ii. p. 182.

the sea by way of the West Scheldt in the latter part of the thirteenth century, and it profited greatly by the silting up of the Zwin, which deprived Bruges of its harbour in the course of the fifteenth century. Of the towns in Holland **Leiden and Dordrecht** were among the first to rise into prominence through the Rhine traffic, but the progress of Dordrecht was arrested by a great flood which in 1421 overwhelmed the adjoining district. After the discovery of the sea-way to India in 1497–99 (122), a great accession of wealth came to the ports of the Low Countries through the commerce carried on by them in eastern products. These were brought by the Portuguese to Lisbon, but Lisbon is not situated, like Venice and Genoa, in such a position that they could be distributed thence into the heart of Europe. From the Italian ports, after being carried across the Alps, they were conveyed by the Rhine and Elbe down stream. After the sea-route to India had been opened up, they were carried into the heart of Europe by the Rhine and Elbe up stream. A sudden increase of prosperity was brought to the Dutch towns owing to the circumstances in which the northern provinces of the Netherlands became a separate political community. In 1579 the seven northern provinces proclaimed their independence of Philip II. of Spain, to whom at that time all the Netherlands belonged. The cause of the revolt was the attempt of Philip to put down the Reformation throughout his dominions. In the Seven Provinces, however, freedom of conscience was proclaimed, and that caused a rapid immigration into Dutch towns of Protestants and Jews, many of whom brought with them the manufacturing skill that had already been raised to a high pitch in Flanders and Brabant, Liège and Namur. Before the close of the sixteenth century the Dutch had made their first direct voyage to the East. In 1602 the Dutch East India Company was founded, and within forty years after that the Portuguese acknowledged with bitterness that almost the entire trade with the distant East had passed out of their hands into those of the Dutch. The commercial predominance of the Dutch in the Malay Archipelago has lasted down to the present day, although their trade generally, including their eastern trade, has been eclipsed by the development of the greater resources of Great Britain.

568. The **seaports** of Holland have not as great natural advantages as their Belgian rival Antwerp, but no pains or expense have been spared to enable the two chief ports, Amsterdam and Rotterdam, to meet the requirements of modern commerce. **AMSTERDAM**,[1] on the IJ, near its old mouth in the shallow Zuider Zee, was formerly difficult of access for large ships. Communication with the sea was first facilitated by the construction of the **North Holland Canal** to **Helder**, at the entrance to the Zuider Zee; but as ships became larger this proved inadequate, and finally a direct communication with the sea

[1] Population, 510,000.

was made by means of the **North Sea Canal**, which is 26 feet in depth, and brings Amsterdam to within a distance of fifteen miles from the new harbour of **IJmuiden**. This canal was completed in 1877, and the shipping of Amsterdam has in consequence increased very rapidly since that date. The internal communications of this port were greatly improved in 1892 by the opening of the **Merwede Canal** (10¼ feet deep), running southwards to Vreeswijk on the Lek and Gorinchem (Gorkum) on the Waal. By this means large vessels are enabled to reach the Rhine (577*a*).

569. ROTTERDAM,[1] on the common mouth of the Lek (now the chief Rhine-mouth) and the Maas, is a port liable to be obstructed by the copious deposits of sediment brought down by those streams. The entrance from the sea to the river on which it stands is too shallow to be entered by large vessels, and the first route to the sea constructed for them was **a canal through the island of Voorne**, entering the Haringvliet at Hellevoetsluis. Now this has been **superseded by the 'New Waterway**,' which enters the sea to the north of the mouth of the Maas. Opened in 1872, this new route was at first too shallow to allow large vessels to ascend without discharging part of their cargo, but it has since steadily been deepened, and improvements are constantly being made.[2] The port, which includes Delfshaven, is the natural port of the Rhine and the Rhine valley, and has greatly benefited by the recent improvements in the navigation of the Rhine above the Dutch frontier (577*a*). According to the statement in the Report of the Royal Commission on the Port of London[3] none of the leading ports of Europe showed so great an increase in the amount of its shipping at the end of the nineteenth century. In the last decade of that century the shipping that entered the port increased by upwards of 100 per cent. A noteworthy feature of the trade of the port is the fact that the amount of the shipping that enters with cargoes is more than twice as great as that which clears, a fact on which some light is thrown by what is stated below (577*a*) as to the Rhine traffic at Emmerich. The ships leaving in ballast mostly go to Great Britain for coal or other cargoes. The **Hook of Holland** (*Hoek van Holland*) has been since 1892 an important place of passenger traffic with Harwich. The **minor ports** of Holland are **Schiedam, Harlingen, Dordrecht, Groningen**, and **Vlissingen** (Flushing). The last is the port on the mail route from England to Holland and North Germany. Harlingen, in Friesland, on the Zuider Zee, has a considerable trade with England. **Terneuzen** is important from its situation at the mouth of the ship-canal leading to Ghent. Since the opening of the Dortmund-Ems Canal (577*a*) the Dutch government

[1] Population, 320,000.
[2] Ships drawing 23 feet can reach the port at any time, and those of 28 feet draught at high-water spring-tides.
[3] Cd. 1151, 1902, pp. 18–19.

has resolved to raise **Dolfzijl** opposite the German port of Emden into a port of the first rank, and to enlarge and deepen the canal connecting it with Groningen. The only towns in the Netherlands with more than 100,000 inhabitants which are not seaports are The Hague and Utrecht (566). **THE HAGUE**[1] (in Dutch *'s Gravenhage* or *Den Haag*) is the seat of the court and of the Dutch legislature, although Amsterdam is officially regarded as the capital of the country. It is rapidly increasing in population, but mainly in consequence of its attractions as a residential city.

GRAND-DUCHY OF LUXEMBURG

570. This is a small independent State, about 1,000 square miles in extent, wedged in between Belgium, Rhenish Prussia, Lorraine, and France. It mainly consists of high ground deeply furrowed by narrow valleys. Small as it is, it has a high degree of economic importance, from the fact that it has in the extreme south very productive deposits of iron ore, immediately adjoining similar deposits in Germany (Lorraine) and France. The grand-duchy belongs to the German Customs Union, and large quantities of the ores are sent to the iron-working districts of western Germany. Much is exported beyond the customs frontier, but more than half is smelted locally.

[1] Population, 210,000.

THE GERMAN EMPIRE

571. The German Empire has an area 70 per cent. greater than that of the British Isles, with a population about 36 per cent. more numerous. The population is thus less dense than that of the British Isles, but it is increasing more rapidly. In the last two decennial periods of the nineteenth century the mean German rates of increase were 1·08 and 1·32 per cent. per annum, as against 0·78 and 1·04 in the United Kingdom. (Comp. pp. xxiv–xxv, and note on pp. 474–5.)

571*a*. As a commercial unit the German Empire, or rather the *Zollverein*, or Customs Union, the affairs of which are now under the control of the Imperial Parliament (the *Reichstag*), includes the grand-duchy of Luxemburg in addition to the whole territory of the empire, with a few trifling exceptions. As the formation of this Customs Union was of the greatest consequence for the industrial and commercial development of Germany, the various steps by which it was brought about are worthy of being placed on record. The first important step towards the diminution in the number of customs barriers within the present territory of the German Empire was the abolition of all internal customs dues within the kingdom of Prussia, as it then was, by the law of May 26, 1818, which came into operation on January 1, 1819. At that time it is said that no fewer than sixty different customs and excise tariffs were in force in Prussia alone. A movement was then set going towards a union among different German states. To this movement Prussia was averse, and the conferences held between representatives of a number of south German states were at first fruitless. At last a union was effected between Bavaria and Würtemberg on January 18, 1828. In the month following a separate union was established between Prussia and the grand-duchy of Hesse (Hesse-Darmstadt). The northern and southern unions then made approaches to each other, and in May 1829 a treaty was concluded between them according to which the two unions agreed to bring their fiscal systems more and more into harmony with each other. Four years later it was agreed that on January 1, 1834, the two unions should merge in one, and before that date Saxony and the Thuringian States agreed to become members of this union also. This date accordingly marks the beginning of the first comprehensive union, but it is important to note that the two great divisions of the kingdom of

Prussia, as it then was, were still severed by the kingdom of Hanover, which remained aloof. In 1835 the Union was joined by Baden, in 1836 by Nassau, Frankfurt-on-the-Main, and some other small States, but not till 1851, when Hanover joined, did the Union embrace a continuous territory throughout the north German plain. In 1852, Oldenburg and Schaumburg-Lippe added their territories to the Union. In 1865, when the Duchy of Lauenburg was annexed to the kingdom of Prussia, and in 1866, when those of Schleswig and Holstein were annexed to the same kingdom, these duchies also became included in the Union, and, after the dissolution of the North German Confederation, the grand-duchy of Luxemburg, which had been a member both of the Confederation and the Customs Union, while made politically by the treaty of London an independent neutral territory, continued to be included in the Customs Union. In 1868 the Union was further extended by the accession of the Mecklenburgs and Lübeck, and finally the Customs Union was completed within its present limits by the inclusion of Hamburg and Bremen, with the exception of the parts reserved as free-ports, in October 1888.

572. Surface. The great plain which makes up north and the greater part of east Germany is for the most part of but slight fertility, and endowed with little mineral wealth, except here and there salt. It is thus on the whole **a region of low density of population.** The greater part of it is not relatively more populous than the south and west of Ireland, the more densely peopled areas within it being chiefly those on the lower parts of the Elbe, Oder, and Vistula, and on the area (including Berlin) between the Elbe and Oder where these two rivers approach one another between lat. 52° and 53°.

573. The remainder of the empire consists **mainly** of **hilly country and tablelands,** and has for the most part a **density of population as high as** that of **the south-east of England,** with a few smaller tracts in which the density reaches or approaches that of the English and Scotch manufacturing districts. This higher density is due partly to the more fertile soil and more favourable climate of the sheltered valleys, partly to mineral wealth and manufacturing industry. In the south-east of the western half of the empire, a region occupying fully the half of Bavaria, and composed in large part of a bleak tableland with a poor soil, and without mineral wealth (except once more salt), has as sparse a population as the greater part of the plain. The height of this tableland is about 1,000 feet lower than that of France (Munich, 1,700 feet).

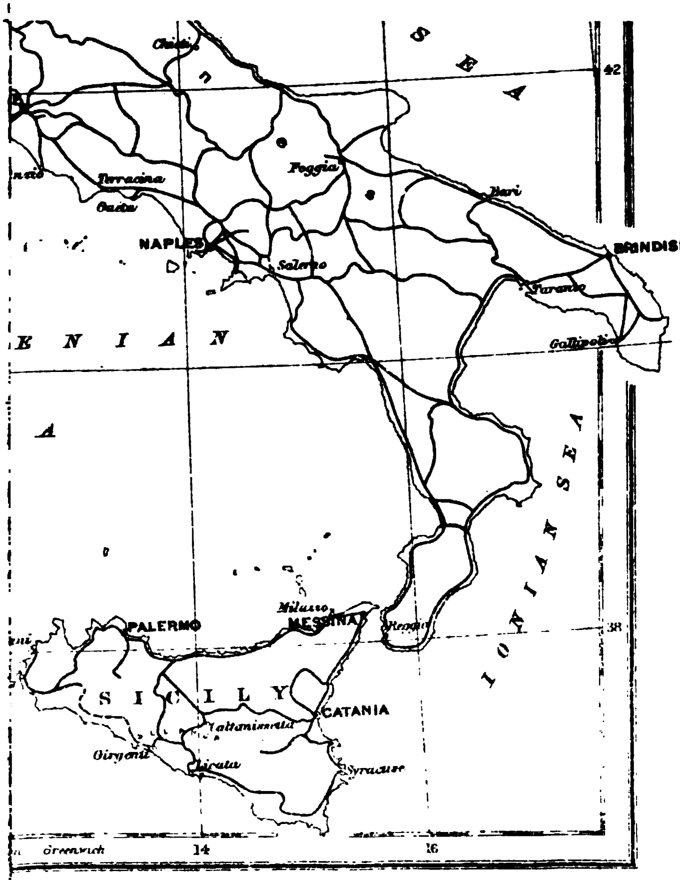
574. In the highland region of south-western Germany the importance of the Rhine valley (567*a*) as an avenue for communication north and south, is strikingly illustrated by the fact that two double lines of railway, one on either bank of the river, ascend the entire gorge from Cologne to the base of the Taunus, and there are several parallel lines higher up. On the German frontier besides the **Vosges** (531) the

Erzgebirge present a serious barrier to communication, on account of the fact that they lie **between the most densely peopled parts of Bohemia and Saxony,** where there is an interval of about forty miles or more uncrossed by rail. The **Bohemian Forest,** on the south-west of the province from which it takes its name, has an interval of more than fifty miles uncrossed by rail between the break in the chain at **Furth** and the gap in the north at **Eger**—the gap which separates the Bohemian Forest from the western end of the Erzgebirge, and towards which several railways converge. There is another railway crossing-place in the Bohemian Forest just to the south of the culminating peak, Mt. Arber, but between this and the Danube (about forty-five miles) there is no other railway from east to west. The Bohemian Forest, however, separates the less densely peopled parts of Bavaria and Bohemia. The **Sudetes** have an interval of about fifty miles uncrossed by railway, between thickly peopled parts of Silesia on the one side, and Bohemia and Moravia on the other, and at their south-eastern extremity several railways converge to the relative depression known as the **Moravian Gate** between the Sudetes and the Carpathians. (Comp. the accompanying railway map, and that on p. 802.)

575. Of the five great **railway routes which cross the Alps** beyond the frontiers of Germany, two are of the highest importance to German commerce. The crossing-places, at the Mont Cenis tunnel (**531**), the St. Gothard tunnel, the Brenner pass, and towards the east of the Alps of Carinthia, lie at nearly equal intervals, at a distance of from 130 to 140 miles from each other in a straight line. **For the commerce of Germany** that of **the St. Gothard is the most important** (**603**), leading as it does directly from the most populous parts in the west of the empire, through the most populous parts of Switzerland, to the most populous parts of northern Italy. **Next in importance** is that by way of the **Brenner** (the valleys of the Inn and Adige), which is the direct route between the most populous parts of Middle Germany (including Berlin), and the eastern part of the north Italian plain. The railway across the **Semmering Pass** (in the east of the Niedere Tauern), by way of Vienna and the Sudetes, or by way of the Moravian Gate, connects the Austrian port of Trieste with the south-east of Germany.

576. Of the mountains entirely within the German frontier, the **Thuringian Forest** is crossed by rail, but the **Harz Mountains** are still a railway barrier for a distance of sixty miles, though railways partly ascend some of the valleys on both sides. The standard gauge of the German railways is the same as that of our own country (4 feet 8½ inches) and all surrounding countries except Russia, where the gauge is five feet.

577. In the plains and valleys the natural and artificial **waterways** are also of great value to the commerce of Germany. The **Rhine,** the **Elbe,** the **Oder,** and the **Vistula** are all navigable to the neighbourhood



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of the German frontier or beyond it; the **Fulda** and **Werra**, the two headwaters of the Weser, to about lat. 51°; the **Danube** from Ulm. The length of navigation on the Rhine from Basel, just within the Swiss frontier, is 510 miles; on the Weser, to the head of navigation on each of its head streams, about 310 miles; on the Elbe, from the frontier, 450; on the Oder, from Ratibor, 480; on the Vistula, from the frontier, 150; and on the Danube to the frontier, 240.

577*a*. But neither these figures nor the map on p. 280[1] indicate the true value of German waterways without further explanations. Of the total length of inland waterways in the empire (8,810 miles), 1,870 miles are available for vessels of nearly 5 feet, and 1,451 miles for vessels of about $5\frac{3}{4}$ feet draught. The Rhine navigation as high as Mannheim far excels that of all other German waterways. Next in importance is that of the Elbe system, referred to in **595*a*-*b***. The other waterways, except the Kaiser Wilhelm ship canal and the Dortmund-Ems canal, are relatively insignificant. The Rhine below Mannheim has been so improved by the State that in 1899 a minimum depth of about 9·2 feet at low water was available, enabling barges of upwards of 2,000 tons burden to ascend to that port. Three or four large barges are now to be seen dragged up and down by a single powerful steam-tug at one time. The results of recent improvements on this navigation and the Elbe, together with the development of German commerce which they have helped to promote, are shown by the following figures:—

Tons of Goods in Millions and Decimals of a Million Carried by Water

	On the Rhine at Emmerich (Dutch frontier)		On the Elbe just above Hamburg	
	Up	Down	Up	Down
Average of 1881–85 . . .	2·59	1·72	1·17	1·10
In 1900	9·04	4·13	2·78	2·52
In 1908	14·19	7·63	3·80	3·09

The notable difference in amount between the up and down stream traffic on the Rhine is a result chiefly of the increasing dependence of the manufacturing regions of western Germany (583) on imported ores and grain, both being heavy commodities of the kind suited to water-carriage. In the three years 1898–1900 these two classes of commodities made up from 51 to above 59 per cent. of the total up-stream traffic. In 1900 upwards of 40 per cent. of all the grain (66 per cent. of all the wheat) and 44 per cent. of all the ores imported into the German Customs Union passed up the Rhine at Emmerich. On the other hand, the chief market for the products of the manufacturing districts referred to is internal, and a great deal of traffic

[1] This map shows the improvements sanctioned by the law of April 1, 1905, which will result in providing Germany with two systems of inland waterways, an east and a west. The improvements in the east will enable vessels of 600 tons to reach Berlin from Stettin by the Finow Canal, and vessels of 400 tons to reach the Vistula east of Bromberg, and to reach Posen from the Oder. The improvements in the west will enable vessels 218 feet long and of 600 tons burden to pass from the Rhine to Hanover. See also **607*n*, 988.**

which might follow the Rhine is diverted to German ports by specially favourable railway rates for export. Coal and coke make up nearly half the tonnage carried down-stream at Emmerich. Ruhrort at the mouth of the Ruhr is the great centre of this trade. Of the river traffic at Hamburg, grain (chiefly rye) made up in 1900 nearly twenty-six per cent. of the up-stream traffic; but down stream there were such heavy commodities as sugar (39 per cent. of the total), manures (13 per cent.), coals (5 per cent.). Of the total tonnage of goods that reached and left Berlin in 1898, 5·6 million tons passed over the waterways against 6·4 million tons on the railways. No navigation dues are charged on the Rhine or its tributaries, and the Elbe navigation is also free as high as Aussig in Bohemia, and that on its feeders, the Havel and Spree, as high as Berlin. The **eastern rivers**, though they have little traffic in ordinary goods, are still important for the floating of timber.

578. A **ship canal**, available for vessels of 12 feet draught, following the course of the Eider from Tönning and terminating at Holtenau in Kiel Bay crosses the province of Schleswig, but the eastern portion of this canal now forms part of the Kaiser Wilhelm (or North Sea and Baltic) ship-canal completed in June 1895. This canal, which begins near Brunsbüttel on the Elbe, has a depth of 28 feet, and has only two locks, one at either end; and of these that at the east end is seldom closed, and the other is open for three or four hours in every tide. It causes a saving in distance of 237 miles, from the mouth of the Elbe, and a saving of greater or less amount for all North Sea ports to the south of the Tyne.[1]

579. In respect of **climate** Germany is less favourably situated than France, not only through being further north, but also through being further east (36), and on account of the high elevation of a large part of the south-west (38), that is, the region with the best climatic position both in latitude and longitude. Only in the **valley of the Middle Rhine** (the plain, namely, between the Vosges and the Black Forest) and those of the Neckar and Mosel are there seven months in the year with a mean daily ~~temperature above~~ 50° F., and only in the Middle Rhine district is there one month with a mean daily temperature of 68° F. or more (comp. **469**). On the other hand, except in the valleys mentioned, there is a regular increase from west to east in the duration of the period with a mean daily temperature below freezing-point. In a large part of the east this period lasts for at least four months.

580. This difference in climate results in a difference in the nature of the **crops**. In Germany, notwithstanding the greater area, the extent of land under corn-crops is fully one-twelfth less than in France, and the crops grown are less valuable than those of the latter country. **Wheat** (including spelt) has in recent years occupied about 4½ per cent.

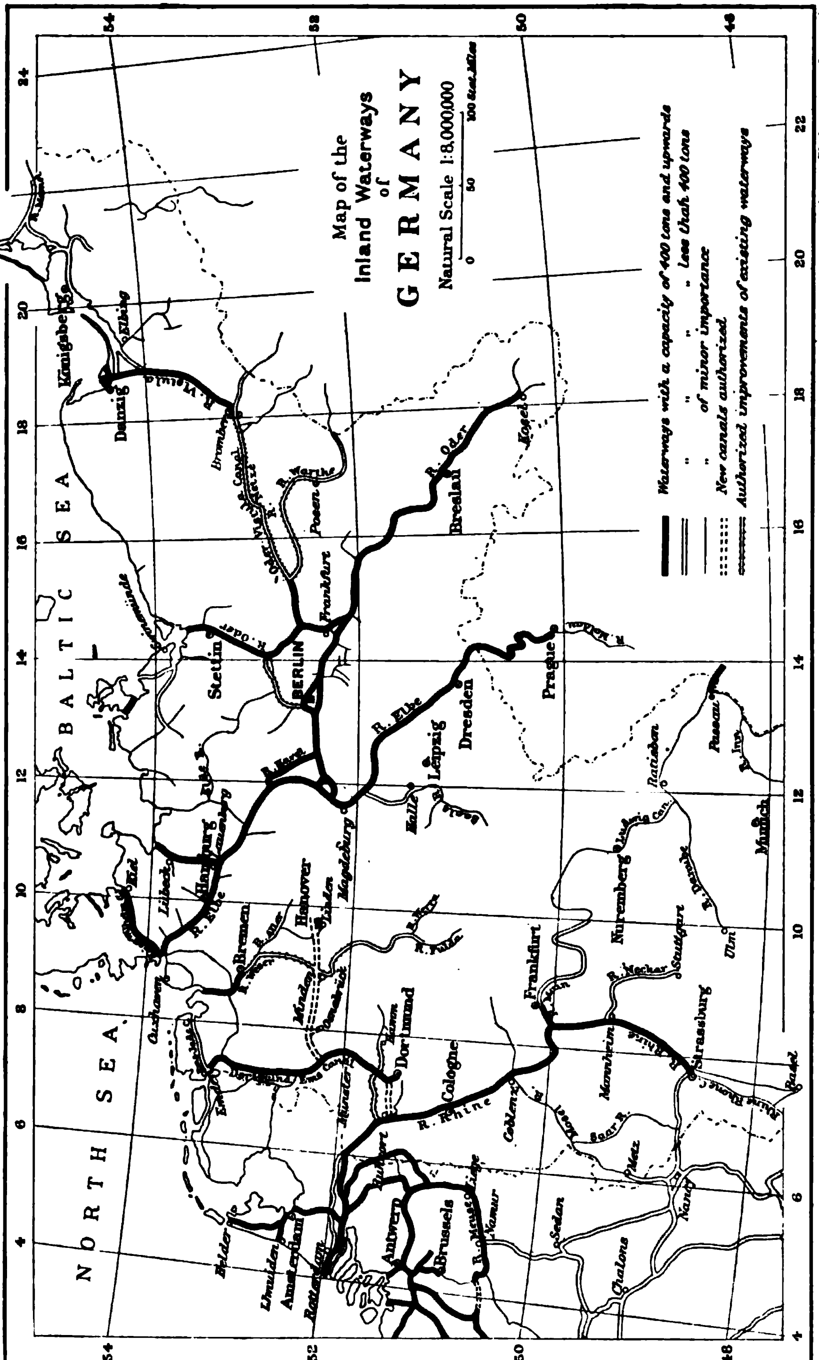
[1] The traffic through this canal increased from 1·5 million tons in 1895–96 to 6·0 million tons in 1906, and to 6·3 in 1909.

of the surface; **rye**, the chief bread-plant, nearly 11 per cent; **oats** about 8 per cent. Among green crops by far the most important in extent of ground occupied are potatoes, which cover $5\frac{1}{2}$ times as large a surface as in the United Kingdom (**171**). Though **vine-cultivation** reaches in Germany the most northerly limit in the world (**179**), the extent of ground in vineyards (chiefly in the sheltered valleys of the south-west) is less than one-sixteenth of the area so occupied in France. In the same region orchards abound, and a limited quantity of maize and tobacco is grown. As to German **sugar-beet** see **308**; as to **hops** see **188**; and as to **wool** see **203**.

581. In **mineral produce**, on the other hand, Germany takes a very high place, ranking among European countries **next after the United Kingdom in total value of production.** Among the minerals, coal (**376**) and iron (**393–97**), as in the other two countries named, are the first in importance. The chief **coal-basins** (see map, p. 281) are that of the **Ruhr**, in Rhineland and Westphalia, that of the **Saar**, in Rhineland and Lorraine; that of **Zwickau and Lugau**, in the kingdom of Saxony, at the base of the Erzgebirge; that of **Upper Silesia**, in the extreme south-east of the province, and that of **Lower Silesia**, a smaller coalfield to the south-west of Breslau. The Prussian state has acquired coalfields both in Westphalia and Silesia. **Lignite** (**373**) is abundant in **Prussian Saxony and the Thuringian States**, where it has given rise to a large mineral oil industry, and likewise furnishes fuel for the numerous sugar-refineries of the district. The production of **petroleum**, chiefly in Hanover, partly in Alsace, is rapidly acquiring importance.

581*a*. The map on p. 281 shows the principal seats of **iron ore** production and their relative importance. The deposits in the extreme west, in Lorraine and Luxemburg (both within the Customs Union) are so poor in iron that they were little developed before the Thomas process (**394**) was introduced in 1879. A further stimulus was given to the production of these ores by the expiration of the Thomas patent in 1894. (Compare the diagram on p. xxxvi.) For the smelting of these ores coke has to be brought from the Ruhr basin, a distance of 200 to 215 miles, principally from **GELSENKIRCHEN**,[1] the chief coke-making centre in Germany. The trains, however, carry much ore back to feed the furnaces which abound on the coalfield. The first coke blast-furnace in the Ruhr basin was set in blast in the early forties of the nineteenth century. Between the river Ruhr and the Emscher lies **Essen**, with the vast works of Krupp; about 20 miles to the south lie **Remscheid** and **Solingen**, the chief seats of the making of cutlery and steel weapons in Germany. The narrow valley known as the **Enneperstrasse** (Enneper Road), beginning about seven miles north-east of Barmen and terminating at Hagen, is a continuous succession of ironworks and forges.

[1] A town which first appeared among those above 100,000 after the census of 1905 through the incorporation of several smaller places.



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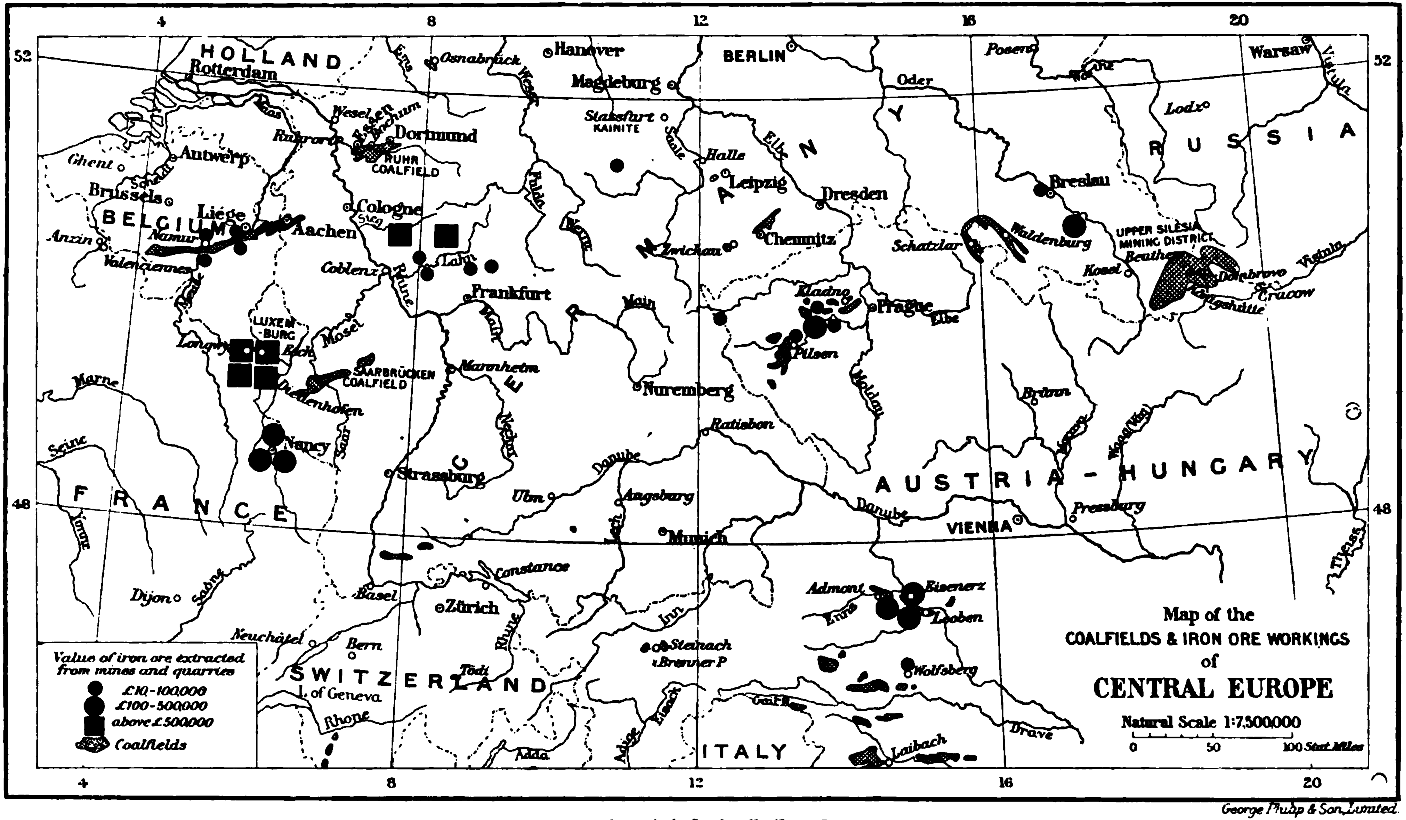

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The facilities for inland navigation in the Rhine basin are of particular importance for the carriage of such heavy commodities as coal and iron ores; and to increase these facilities, a **canal** has been constructed connecting **Dortmund in the Ruhr basin** with the **Ems navigation**, and thus with the port of Emden (**592**). The canal is $8\frac{1}{2}$ feet deep, and can be navigated by vessels of 750 tons burden. It has also been proposed to deepen the Mosel so as to cheapen the carriage of the iron ores of Lorraine to the same basin.[1]

581*b*. **Zinc** (**419**) and **lead** (**414**) are obtained in Silesia and the Rhine Province, the latter also elsewhere. In Silesia, the **centre of zinc (calamine) production is Königshütte** (see map, p. 281); in the Rhine Province, near Aachen, close to the zinc-producing district of Belgium (**557**). **Copper** is produced chiefly in the Harz, at Mansfeld (**413**), **silver** at Mansfeld and at Freiberg in Saxony.

582. The chief **salt**-producing district in Germany is in the Prussian province of Saxony, and among the salt-mines of this district, those of **Stassfurt** are of peculiar scientific interest as well as economical importance. Above an exceptionally pure deposit of rock-salt (containing 98 per cent. of chloride of sodium—**457**) there lies a bed of mixed 'potash salts,' found here for the first time free in nature. At first these potash salts were merely treated as waste products, but since 1860 they have been made the basis of various chemical industries, and have made Stassfurt the seat of a greater number of chemical factories than are probably to be found on an equal space anywhere else in the world. From the salts as they are found in nature are extracted carbonate of potash (**451, 459**), used in soap-making, dyeing, bleaching, glass-making, calico-printing, pigment-making, pottery, &c.; sulphate of potassium, used in an impure state under the name of kainite, which contains also a certain proportion of magnesium salts, as a fertiliser (**423·11**), and for other purposes; nitrate of potassium, for gunpowder-making, glass-making (**451**), pickling, &c.; various compounds used in photography, such as cyanide, bromide, and iodide of potassium, besides a great variety of other substances. At the neighbouring town of Schönebeck, on the Elbe, are the largest salt-works in Germany.

583. Among the **manufacturing industries** of Germany not directly depending on its agriculture and mining, the most important is that of **woollens**, and next to that **silks** and **cottons**. These and other branches of the textile industry have their chief seats on and near the great coalfields, the Ruhr basin especially being as thickly studded with manufacturing towns as Lancashire or the West Riding of Yorkshire. The adjoining towns of **BARMEN** and **ELBERFELD**[2] here carry on all branches of the textile industry, but above all woollens and silks, Barmen being specially noted for bindings, braids, and trimmings.

[1] The map shows that this has not yet been done.
[2] Combined population, 320,000.

KREFELD, west of the Rhine, is next after Lyons the most important place in Europe for the manufacture of **silks** and **velvets**, and, like Lyons, has the industry favoured by the excellence of the water for dyeing. (See also **30, 234.**) **AACHEN** (Aix-la-Chapelle), on a small detached coal and iron field to the south-west, is the chief seat of the manufacture of **woollen** (as distinguished from worsted—**214**) cloth in Germany. The **cotton industry**, along with other textile manufactures, is also very highly developed in Alsace-Lorraine, at **Mülhausen, Kolmar, Gebweiler**, and other places in the valley of the Middle Rhine, where the industry had already taken firm root before this district was acquired from France, and where coal, though not found in the immediate neighbourhood, can easily be conveyed from the coalfields at no great distance, and can be supplemented in the towns at the foot of the Vosges by the water-power afforded by the mountain streams (**76**).

584. CHEMNITZ,[1] 'the Saxon Manchester,' a great seat of cotton and other textile industries, as well as of the manufacture of machinery (**30**), is the centre of the manufacturing region connected with the Saxon coalfield; and **BRESLAU, Görlitz**, and **Liegnitz** are the chief manufacturing towns of Silesia. **Görlitz**, which lies in one of the districts that acquired for Silesia so great a reputation for its **wool** (**203**), is specially noted for its woollen manufactures as well as its machinery. Hosiery flourishes chiefly in Saxony and Würtemberg (**STUTTGART** &c.).

585. Notwithstanding the influence of coal in localising textile as well as other industries, it is a noteworthy characteristic, both of the cotton and the woollen industry in Germany, that they are much more widely scattered than in England. This difference is particularly striking in the case of cotton-spinning, the leading towns in which are distributed over a large part of Germany to the west of the Elbe,[2] some in places far from any coalfield, though the greater number are in Alsace and the Prussian Rhine Province. Except in yarns Germany now exports a greater value of every product of the cotton industry than it imports,[3] but in spite of heavy duties[4] it still imports from England and elsewhere large quantities of cotton and woollen and worsted yarns, especially the finer qualities. In recent years Germany has almost entirely freed itself from its dependence on Liverpool for supplies of raw cotton. The great German **cotton market** and place

[1] Population, 210,000.

[2] In 1898, out of sixteen places with more than 100,000 cotton spindles five were in the part of Prussia west of the Elbe and three in Alsace, while the kingdoms of Bavaria and Saxony had four each. Mülhausen came first with nearly 500,000 spindles (compare Oldham with nearly 12,000,000), Augsburg second with less than 400,000.

[3] In 1897 considerably more than one-third of the total value of cotton fabrics of various kinds manufactured in Germany was exported.

[4] The duties on the finer woollen and worsted and cotton yarns amount under the new tariff which came into force on March 1, 1906, exceed in some cases 80s. per cwt.

of import of raw cotton is Bremen, the German port having greatest conveniences with respect to the principal towns engaged in the industry. A cotton exchange was established there at the end of 1872, and in 1886 this became a national institution through an arrangement concluded between it and an association of German cotton spinners.[1]

586. With regard to the textile industries of Germany in general, and more especially the silk industry, it is a noteworthy fact that the weaving branch is still to a very large extent a domestic industry, employing hand-looms, and that the transference from domestic to factory labour is now being accomplished at the cost of great hardship to the domestic weavers. According to a return of the United States consul at Krefeld in 1884, about 90 per cent. of the fine silk, half silk, velvet, and plush goods manufactured in the district was then still made on hand-looms, and the weavers kept poverty at bay only 'by unremitting toil such as the indomitable German artisan will endure year in and year out.' In Silesia the condition of the hand-loom weavers would appear at the same date to have been even worse than in Krefeld. 'The home weaver,' writes another consul of the United States, 'who works steadily for at least eleven hours a day, assisted by one of his children as spooler, earns about one dollar forty-three cents [about six shillings] per week.' At the census of occupations in Germany in 1882 more than a fourth of those engaged in textile industries carried on their trade domestically.[2]

In these circumstances, writes one of the consuls here cited, any change would be for the better; yet he adds that the hand-weavers are fighting for their industry to the bitter end. That a change for the better has been already brought about where factory labour has been adopted may be fairly inferred from the report of an English consul writing from Düsseldorf in 1886, who says: 'The general material welfare of the people of these provinces [Westphalia and the Rhineland] is better—to judge by appearances, with exception perhaps of the few years immediately after the Franco-German war—than it has ever been in the memory of man; they are decidedly better fed, better clothed, and better housed, also better educated, than at any former period.'

587. Even yet, however, the organisation of labour for textile and some other industries is inferior in Germany to that which has been attained in Great Britain through the longer course of industrial development in the latter country, and the concentration of industry

[1] The import of raw cotton at Bremen increased from 158,000 bales (? of 500 lbs.) in 1870 to 1,567,000 bales in 1900. The export of raw cotton from Great Britain to Germany reached its maximum, 775,000 cwts., in 1887. In 1901 it had sunk to 47,000 cwts., but it rose in 1902 to 131,000 cwts. See Oppel, *Die Baumwolle* (Leipzig, 1902), pp. 1–6, 661–2.

[2] At the census of 1895 nearly 90 per cent. of the textile employees worked in establishments employing more than five persons. Nevertheless, hand weaving still struggles on perseveringly in some districts, as in the hill country of Silesia.

and greater subdivision of labour that have thus been brought about. Technical processes in Germany are still imperfectly specialised. The artisans may as a rule be individually fitted for a greater variety of work than those of England, but their labour in each department is less efficient than that of the English artisan, who is trained to perform particular operations with the utmost celerity consistent with exactness. To this cause is due in a large measure the inferior value, and hence the lower wages, of German as compared with English labour.[1] (Compare, however, **590*b***.)

587*a*. One of the most notable developments of German industry in recent years has been in ship-building and marine engineering. The progress of ship-building in Germany, which has advantages for the industry in some respects similar to those of the United Kingdom (**494*a***) with the addition of special assistance in the form of reduced railway rates for ship-building materials, is shown in a table in the Appendix. The chief establishments are at **Stettin**, where the Vulcan Company has built some of the largest liners afloat, the Weser ports, Hamburg and Elmshorn (below Hamburg), Kiel, Lübeck, Rostock, Flensburg, and Danzig. River-steamers are also built at Dresden and other river-ports.

588. Among other notable German manufacturing industries may be mentioned the **clockmaking** of the Black Forest; the **porcelain** manufactures of Meissen, which has the royal factory of 'Dresden' china, of Zwickau, and Berlin; the making of **pianos** in Berlin, Stuttgart, Leipzig, and Dresden; and of **scientific instruments** in many university towns, but chiefly in Munich. **The chief seats of chemical industries** in Germany **besides Stassfurt** (582) are **Elberfeld and Barmen, Bonn, Berlin, Leipzig, Stuttgart.**

589. The foreign commerce of Germany shows a more remarkable development within the last twenty or thirty years than that of any other European country.[2] Comparing the earliest with the latest periods for which figures are given in the statistical Appendix under

[1] In recent years there has been a great change, but this is still true of some branches of the textile industry.

[2] The figures on pp. 446 and 603 of the appendix show some very remarkable features, some of which correspond in a striking manner with certain features of British trade. The figures are for six successive periods, all except the first quinquennial. In the first two periods there was a great excess of imports over exports. In the third these were brought almost to an equality. In the last three there has been, as in the United Kingdom, a progressive increase in the excess of imports over exports. For three periods in succession 1881–85 to 1891–95 the value of the exports was nearly stationary, and it is noteworthy that the slight decline in 1891–95 was in spite of the fact that that is the first period in which the trade of Hamburg and Bremen was included in every year of the period (571*a*). In 1896–1900 there was a great expansion in the value of the exports, just as in the United Kingdom. Another striking correspondence with the British trade is to be found in the fact that the exports which in recent periods have shown a relative growth are not the products of the great textile industries (woollen, cotton, silk), nor those in the paper and leather manufactures, which have long been important in Germany, nor pig and unwrought iron, the first products of an industry which has been expanding with great rapidity in Germany, but coal and machinery; and the most rapidly growing imports have been

the head of imports from different countries, we find that Germany has increased its percentage in nearly every case in which its share in the commerce is important enough to be mentioned at all. In the commerce with Spain it has gained 9·08 per cent., in that of Italy 6·16 per cent., in that of Roumania 7·48 per cent., in that of France 8·87 per cent., in that of Holland 6·61 per cent., in that of the United Kingdom 0·11 per cent., in that of Norway 2·38 per cent., in that of Sweden 6·08 per cent., in that of the Argentine Republic 3·14 per cent., in that of Uruguay 8·26 per cent., in that of Chile 6·96 per cent., in that of the United States 1·84 per cent. There is a loss in percentage only in the commerce of Belgium and Russia—in the former case to the extent of only ·61 per cent., in the latter 8·15 per cent.

The fact that on a comparison of the same periods under the same heading the United Kingdom is found to have lost ground in every country except Holland, New Zealand, the Argentine Republic, and Chile, that in the case of Holland the gain of the United Kingdom is greatly inferior to that of Germany (Prussia), and in Chile is also inferior, though not to the same extent, shows that Germany is becoming or has become a formidable rival in many foreign markets, although it must be remembered that in some cases the absolute difference indicated by these percental differences is very small, the total trade being insignificant.[1]

590. Of the causes that have led to the commercial advance of Germany some are obvious. The most important, perhaps, is the **development of the mineral resources** of Germany and of the modern methods of industry to which these resources give life (**506**). The consequent accumulation and cheapening of capital has facilitated the advance which this development first promoted, and an enormous stimulus was given to the advance by the vast acquisition of capital in the shape of the French indemnity after the close of the Franco-German war of 1870–71.

590*a*. Another important factor contributing to the commercial development of Germany has been the construction of railways, and in this connection it should be noted that Germany is surrounded by some of the wealthiest countries of Europe, all, except Russia, having railways

those of grain and flour. The sugar exports have held their own (306–8). Since 1879 the German Empire has followed a highly protective policy.

[1] These remarks of the first edition are based on the comparison of the figures stating the average for the years 1881–85 in different countries. The facts set forth in pars. 16–19 of the Introduction to the Fourth Edition give some interest to a comparison between the United Kingdom, Germany, and the United States, on the tables in the appendix. A comparison of the figures in the latest tables added to the appendix with those for the latest period or year given in the previous edition shows that the United Kingdom had maintained its percentage in the import trade of France and Belgium, but that in all other countries for which figures are given its percentage had gone down; in the export trade its percentage had gone up in some cases, down in others; Germany, both in the import and export trade of the countries for which data are given, had advanced in some cases, declined in others; while the United States had improved its position in both the import and export trade of nearly every country mentioned, and in other cases at least maintained its position. For details the reader is referred to the tables themselves.

on the same gauge. (See Introd. to the Fourth ed. par. 8.) Three of the Alpine railways, the Brenner, the Arlberg, but above all the St. Gothard, are of special importance to Germany, as may be seen from one example. In 1880, before the opening of the St. Gothard tunnel, the quantity of iron and steel in plates and bars of 5 millimetres (0·2 inch) or more in thickness imported into Italy from the United Kingdom was nearly 60 per cent. of the total under this head (the largest under the general head of iron and steel), that from Germany 2 per cent. In 1890 the proportion derived from the United Kingdom was less than 22 per cent.; that from Germany more than 52 per cent., and more than nine-tenths of Germany's share was introduced by land.[1]

590*b*. None of these causes of the development of German commerce is of a nature which this country could have prevented, or which it would have been the interest of this country to prevent if it could. The advantages which Germany derives from the development of native resources and improved communications abroad are of a kind that must be shared directly or indirectly by all countries with which Germany has dealings.[2]

But there is another cause of the recent commercial success of Germany which it is of the highest importance for other countries to consider, namely, the advanced state of the higher education, and especially **commercial and technical education** in Germany. The effect of this in the growth of the chemical industries of Germany is referred to elsewhere (**458, 462**), but there are numerous witnesses to its immediate effects in promoting German commerce, inasmuch as it places at the command of German merchants large numbers of men well qualified by their knowledge of foreign languages, of products and industrial processes, and of business routine, to act as travellers, and yet content with a salary which would be looked upon as wholly inadequate by persons possessing the same qualifications in this country even when such are to be had.

591. The recent territorial acquisitions of Germany in Africa and the Pacific have not yet had time to have much effect on German commerce.

592. For the despatch and reception of its transmarine exports and imports Germany is largely dependent on foreign ports—those of Belgium, Holland and France, Italy and Austria. None of its own **seaports** is so conveniently situated for the commerce of the chief mining and manufacturing region of the west as Antwerp or Rotterdam. There are very **few German seaports with a sufficient depth of water for ships of the largest size.** Down to the last decade of the nineteenth century the only two with a depth of **more than 25 feet**

[1] In 1897 the United Kingdom had improved her position under this head, Germany lost ground.

[2] From the table on p. 602 of the appendix it will be seen that Germany now ranks next after India as a market for British produce and manufactures. In 1906 the leading exports from the United Kingdom to Germany were yarns of all kinds (nearly £8·8 millions), coal (nearly £3·5 millions), and machinery.

were those of **Bremerhaven**, the outport of Bremen, on the Weser, with the adjoining Prussian port of Geestemünde, and **Cuxhaven**, the outport of Hamburg; but since then Hamburg, Bremen, and Emden, all North Sea ports, have been added to the number. The basins at **Hamburg** now have a depth at mean tide up to 28½ feet, and the rise of the tide adds from 8 to 5 feet. Below Hamburg, however, a bar beginning at Blankenese extends to Brunshausen, 21 miles below the town, and the deepening operations so far carried on have not yet sufficed to enable ships of the full size admitted by the Suez Canal to ascend to the docks except at high water, and the large American liners, drawing when laden upwards of 30 feet, never ascend above Brunshausen. The port, however, has the advantage of being comparatively free from fog, and by means of ice-breakers it is now kept always open. The depth alongside the quays at the adjoining port of **Altona** is only 22 feet, and the greatest depth at **Harburg**, on the opposite side of the Elbe to Hamburg, is only 19 feet. At **Cuxhaven** the depth at low water is 26½ feet. In the tidal basin which forms the free-port of **Bremen** the depth at low water is 26¼ feet, and here also the channel is always kept free from ice. At **Bremerhaven** the depth is as much as 35 feet. **Bremen** proper was long a seaport without ships since even small sea-going vessels ascended the Weser no higher than Vegesack, about ten miles below Bremen. At **Emden**, which, by the construction of the Dortmund-Ems Canal, has been made a considerable coal-port, the depth at ordinary high water is 33 feet. **Swinemünde**, the outport of Stettin on the Oder, has a depth of 24 feet.

593. The principal other German seaports are the Baltic ports of **Lübeck** and **Travemünde**, on the inlet that receives the River Trave, **Rostock** on the Warnow, **Stralsund**, opposite the island of Rügen, **Anklam** on the Peene, the western influent of the Stettiner Haff, **Stettin** itself, **Königsberg** on the Pregel (Frisches Haff), and **Memel**, at the northern extremity of the Kurisches Haff. These have a depth at the medium state of the water of from 15 feet (Stralsund) to about 22 feet (Stettin). Between the mouth of the Oder and Danzig, on a coast-line of about 250 miles, there is no seaport of any consequence. **Kiel** is an important station of the German navy, and **Wilhelmshaven** on the Jahde, west of the mouth of the Weser, is solely used for this purpose.

594. Of all the German seaports, by far the most important at the present day is **HAMBURG**,[1] including Cuxhaven. Like Liverpool, however, Hamburg has risen to a dominant position among seaports only in comparatively recent times. English and Dutch settlers, after the discovery of the sea-way to the East (**100**), first made it an active scene of shipping, but the chief impetus to the development of its trade was given only in the eighteenth century, when the American war of independence opened to it various colonial ports. With the

[1] **Population, 700,000; Hamburg-Altona, 870,000.**

development of American and other trans-oceanic commerce that has since taken place, Hamburg has steadily risen in population, wealth, and commerce, its admirable water-communications upwards as well as downwards greatly favouring its growth. The only bridges across the Elbe here are at the upper end of the city, but a tunnel for passengers and vehicles lower down is expected to be opened early in 1911. (See also **612a**.) **ALTONA**, the Prussian seaport immediately adjoining Hamburg, has a similar trade.

595. BREMEN, with its outport of **Bremerhaven**, is the only other German seaport with a large American and trans-oceanic commerce. **Lübeck**, before the commencement of trans-oceanic commerce the most important of all German seaports, began to decline in the fifteenth century, and only recently has begun to show any revival. During the fourteenth century one of its rivals was **Wismar**, on the coast to the east, but this port has sunk into complete insignificance, and its commerce has passed to the still more easterly port of **Rostock**. **STETTIN**[1] derives a good deal of its importance from its being the nearest seaport to Berlin, as well as from its connections with the populous region of Upper Silesia. The eastern ports **DANZIG**. **KÖNIGSBERG**, and **MEMEL** all have a large export trade in timber, grain, flax, hemp, potatoes, and other agricultural products, partly of Russian origin, but the import trade of Königsberg and Memel is greatly hampered in its development by the Russian customs duties.

595*a*. The difference in the relative importance of German seaports in former times and now is partly due without doubt to political causes, but it is possible also to recognise geographical causes as powerfully operating at the same time. In trying to account for the predominance of **Lübeck** in the middle ages one must first notice that the narrowness of the Baltic Sea and the number of islands within it favoured the rise of shipping in the infancy of navigation. Short voyages brought a greater number of ports into communication with each other than on the North Sea, more particularly the German shores of the North Sea. The difficulty of communication by land contributed here as elsewhere to the rise of numerous ports, each having for the most part a small hinderland except where they stood at the mouth of a great navigable river, and generally the importance of a seaport was in direct relation to the importance of the waterway which enlarged its hinderland. In early times *Julin*, close to the site of the modern Wollin, was an important port at the mouth of the Oder, and it is noteworthy that being a Slavonic town it stood on that mouth of the Oder which is turned towards the Slavonic east. When it was destroyed by the Danes in 1177, the Teutonic town of **Stettin**, already several centuries old, promptly took its place, and has held that place ever since. **Danzig** and **Elbing** were in the middle ages equally

[1] Population, 210,000.

accessible ports at the mouth of the Vistula and were rivals for the trade of that river; **Königsberg** had a corresponding importance as the outlet of the Pregel. None of the ports of this region, however, had any great consequence till order was established there by the knights of the Teutonic order in the period after 1230. Elbing and Königsberg were both foundations by that order, and though Danzig is a much older town it did not attain prosperity till after it was purchased by that order in 1309. Lübeck, the most important of all the Baltic ports and indeed of all German ports in the middle ages, is an obvious exception to the general rule above stated as mostly determining the relative importance of seaports. Its river is comparatively insignificant. But it is to be noted that there was a very important trade in western Germany, including the trans-Alpine trade in the valuable products which had to be brought into connection with the Baltic ports in the aggregate, and manifestly no other port is so conveniently situated for that purpose as Lübeck. This was so even before there was any waterway from Lübeck to the Elbe, a fact clearly indicated by a significant exception in the privileges conferred by Henry the Lion on Lübeck in 1167. Lübeck was then granted among other things exemption from all tolls and customs in Henry's duchy of Saxony except at Artlenburg. Artlenburg is situated on the left bank of the Rhine at a point nearly due south of Lübeck, and nearly opposite the southern end of the subsequent Stecknitz and the present Elbe-Trave Canal. It is fair to surmise that already in 1167 the dues collected there were too valuable to forego, which implies that the trade across the Elbe at this point was by this time important. One large item in that trade in the twelfth and subsequent centuries was Lüneburg salt, a very valuable commodity when salt fish and salt meats formed a much larger proportion of the food of the people than now. But Lüneburg was only one station on a land route leading south-westwards along the base of the German highlands, and tapping the trade also of the Weser and the Rhine. Important medieval remains, not only at Lüneburg, but also at Hanover, Minden, Osnabrück, and Münster still bear witness to the former importance of this route, by means of which the valleys of the Elbe, Weser, and Rhine were all brought within the hinderland of Lübeck in relation to the Baltic trade. This hinderland was made much more accessible when Lübeck merchants constructed the Stecknitz Canal in 1390–98, and even at the present day the importance of the relations of the Baltic as a whole through Lübeck with western and south-western Germany is shown by the immediate success of the Elbe-Trave Canal, adapted for ships up to 800 tons burden [1] (depth $8\frac{1}{8}$ feet), which was opened in 1900, and now takes the place of the Stecknitz Canal. The opening of the canal has developed

[1] Vessels of this size can ascend the Elbe as high as Aussig, the chief lignite river-port of Bohemia, about 400 miles above Hamburg.

a large trade between the upper Elbe and Baltic ports, above all those of Russia.[1] (See the map of German hinderlands, pp. 54–5.)

595b. When trans-oceanic shipping came to surpass in importance that of the Baltic the advantages of Hamburg were just as decisive as those of Lübeck had been formerly. The Elbe and its tributaries gave access to central and southern Germany as well as Bohemia, and the construction of the short Friedrich Wilhelm Canal connecting the Spree with the Oder, as far back as 1662–68, brought the upper Oder also within the hinderland of Hamburg, at least in relation to trans-oceanic shipping. Subsequent improvements have enhanced these advantages. Since 1897 vessels of 400 tons have been able to ascend past Breslau to Kosel, the port of the coal and zinc-mining region of Upper Silesia. As the waterways had to a large extent determined the importance of German towns before railways were introduced, the railways have been made to follow the lines of the chief waterways, and thus to confirm the connections already established. There is a double line of railway connecting Breslau with Hamburg, but not with the nearer port of Danzig, or if there is now (1902) there was not a few years ago. Additional importance was of course given to Hamburg by the development of the coal, lignite, and other mines which have helped to maintain and expand the manufacturing industries of Saxony and Bohemia. Bremen has not nearly so extensive a hinderland as Hamburg, but it has the advantage of being nearer America, a matter of importance for passenger traffic,[2] and nearer the coalfield of the Ruhr basin, a matter of great importance so long as political considerations lead to the diversion of a large part of the trade of that region from its natural ports of Rotterdam and Antwerp. The map of the waterways of Germany will make it manifest that the carrying out of the project of the Midland Canal would benefit Bremen much more than Hamburg.

595c. During the middle ages the commerce of Germany was

[1] From this cause the shipping of Lübeck in 1902 (a year of depression in the German shipping trade generally) was twice that of 1901.

[2] For passenger trans-Atlantic traffic both Bremen and Hamburg have obvious advantages over the English ports, each having a much more populous hinderland to draw upon and both being able to tap hinderlands of the English Channel at Southampton or Plymouth, and Boulogne or Cherbourg. The figures below give the number of passengers carried to New York by the North German Lloyd (Bremen), the Hamburg-American Company, and the only two English companies carrying as many as 15,000 steerage passengers in 1901. These figures refer solely to the traffic from northern ports, and do not include passengers carried by the Mediterranean services of the two German companies.

—	North German Lloyd	Hamburg-American	White Star	Cunard
Cabin . .	20,403	20,524	18,167	17,783
Steerage .	76,804	63,223	30,483	19,943
Total .	97,207	83,747	48,650	37,726

greatly promoted by the Hanseatic League, a confederacy which at the time of its greatest extension and influence embraced nearly all the sea- and river-ports of modern Germany and the Netherlands up to Cologne on the Rhine, Magdeburg and Halle on the Elbe and Saale, Frankfurt on the Oder, and Thorn on the Vistula. At what date it was founded is uncertain, but before the close of the thirteenth century it was powerful enough to check the disorders to which its rise was due, piracy at sea, and the rapacity of the numerous petty princes and ecclesiastical dignitaries among whom Germany was at that time divided, the authority of the German emperors being then little more than nominal. The armed forces which it maintained, especially at sea, procured respect for it, and powerfully contributed towards the acquisition of privileges which at sundry times it obtained in foreign countries. Its internal organisation varied at different times. At one time it formed three great divisions, one with Lübeck, one with Wisby on Gothland, and one with Cologne at the head. At another time (after 1367) there were four great groups under the presidency of Lübeck, Cologne, Brunswick, and Danzig respectively. At all times, however, Lübeck had the chief place, a natural consequence of the circumstances mentioned in par. 595*a*. There the diet met, and there the archives of the confederacy were kept. Abroad the confederacy had four great factories—at Bruges, London, Bergen, and Novgorod (on the Volkhov). The confederacy began to decline in importance in the sixteenth century, when the German emperors recovered some of their power, and England, Scandinavia, and Russia had also become more powerful. It finally sank into complete insignificance during the Thirty Years' War (1618–48), which had such a prolonged disastrous effect on Germany generally.

596. All the **Baltic ports** are subject to the inconvenience of being **closed by ice in winter**, and the interruption of traffic from this cause is of course (36) longer the further east the port lies.

597. The following are the chief inland towns of Germany in the order of their population:—[1]

Greater Berlin	2,500	Düsseldorf	215
Berlin-Charlottenburg	2,200	Chemnitz	210
Munich (München)	500	Stuttgart	175
Leipzig	450	Halle-on-the-Saale	160
Breslau	420	Strassburg	150
Dresden	400	Dortmund	140
Cologne (Köln)	375	Mannheim	140
Elberfeld-Barmen	300	Aachen-Bürtscheid	135
Hanover-Linden	300	Brunswick (Braunschweig)	130
Frankfurt-on-the-Main	300	Essen	120
Nuremberg (Nürnberg)	260	Krefeld	107
Magdeburg	230	Kassel	106

Of these towns, Munich, Dresden, Stuttgart, and Brunswick, besides Berlin, owe a great part of their importance to the fact of their

[1] The population is given in thousands in round numbers.

still being local capitals; and to these may be added Strassburg, which is the seat of the local government of Alsace-Lorraine. Frankfurt-on-the-Main, moreover, was at one time in a sense the capital of Germany, and Hanover the capital of a separate kingdom. It is chiefly to its rank as capital, together with its central position in the German plain, that **BERLIN**, which is a town of comparatively modern growth, owes its commercial importance. Like other large capitals, it is the seat of many industries (the making of machinery of all kinds being that for which it is most noted), and since the establishment of the German Empire it has become the centre of banking and exchange in succession to Frankfurt-on-the-Main.

598. Local conditions have made **BRESLAU** an important centre of commerce from an early period. It arose at the only convenient crossing-place of the Oder for a considerable distance up and down (114), and as far back as the twelfth century it is mentioned (under the name of Wratislaw) as the chief city of Silesia. For seven centuries it has been the place where the industrial products of the West have been exchanged for the agricultural products of the East, and the commerce of this nature has been greatly increased by the modern developments of industry in consequence of the existence of two coalfields as well as other mineral deposits in the vicinity. It has hence become the place of convergence of all the south-eastern railways. (See the map on p. 302.) Six per cent. of the inhabitants are Jews.

599. MUNICH, though situated on an inhospitable plateau, was already the capital of a Bavarian duchy in 1255, but only grew into importance after Bavaria became a considerable state, about the beginning of the nineteenth century. The size which it had already attained at the time of the introduction of railways naturally caused it to be selected as a **railway centre**, and the commercial advantages which it derives from that circumstance are all the greater from the fact of its being the most convenient place of division of the commerce which passes across the Alps by way of the Brenner. One important line of railway proceeds from Munich north-westwards by way of Augsburg and Frankfurt to the most populous region of the Rhine basin; another northwards to Saxony and Berlin by way of the Naab valley (which in earlier times helped to give a now lost importance to Regensburg or Ratisbon on the Danube); a third north-eastwards to Prague. It has hence to a large extent superseded not only Augsburg, but also Regensburg and Ulm. Modern commercial routes pass through the latter places without conferring on them any special importance.

600. Of the other inland towns mentioned above, and not already particularly noticed, that which is of most interest on commercial grounds is **NUREMBERG**, and the interest in this case arises from the fact of its being an old industrial town whose manufacturing industry

was chiefly maintained in earlier periods by its favourable situation for trade. It lies in a basin surrounded by hills, through which, however, there are openings in all directions which have made it a natural point of concourse for all south-west Germany. Other natural advantages, on the other hand, it lacked. Special privileges were granted to it by the Emperor Frederick II. in 1219, expressly because it had neither vineyards nor shipping and lay upon the most sterile soil ('auf rauhestem Boden'). In the middle ages it was the chief manufacturing town in Germany, and though in modern times it has been eclipsed by other manufacturing towns with greater advantages according to modern requirements, it has never lost its character as an industrial and commercial city. The characteristic manufactures of the place are such as might be expected from its history and position, being those which demand little material and little expenditure of mechanical power, but much skill on the part of the workmen. Besides the making of toys, material for which is supplied by neighbouring forests, and pencils made with graphite (423·14) from Passau and elsewhere, various kinds of artistic metal-work and the manufacture on a large scale of electrical apparatus furnish the chief employment of the industrial population. The early importance of the town is indicated by its having long been known in England under an English form of name.

600*a*. In the middle ages, when trans-Alpine commerce had a high degree of relative importance, Ratisbon, Nuremberg, Augsburg, Ulm, and Frankfurt all reached a high degree of prosperity in connection with that trade. Ratisbon owed its commercial, and hence also a high degree of political, importance to its connections with the traffic on the Danube and that across the Brenner, the entrance to which route is made where the Inn valley emerges on the high plains of Bavaria immediately to the south. When Constantinople was the capital of a Christian empire and as such the focus of a great trade in valuable commodities, one of the routes leading from it was that of the Danube to the heart of Europe. At Ratisbon goods would leave the river for the Elbe basin and for Frankfurt and the gorge of the Rhine, or join the river from those directions, and for all these reasons it was a highly important focus. Nuremberg stands directly on the route from Ratisbon to Frankfurt, and without doubt this circumstance would contribute to its early commercial and industrial development. Ulm, the head of the Danube navigation, lies at a point where an easy route leads across the Black Forest to the middle Rhine valley, and almost due north of the opening, through the upper Rhine valley, at the head of Lake Constance, of many pass-routes leading across the Alps. Augsburg again was at the fork of the roads leading on the one hand to the Rhine valley passes just referred to, on the other hand across the Seefeld Pass to Innsbruck and so to the Brenner. The surviving palace of the celebrated Augsburg house of the Fuggers at Trent on the

latter route (**609***a*) is a notable witness to the importance of the Augsburg connections of former days in this direction.[1] In addition to the advantage of situation above indicated, Frankfurt served to connect the valley of the middle Rhine with the Weser and Elbe valleys and Lübeck, and the importance of these relations is still illustrated by the railway connections of the city.

600*b*. In paragraph **592** it is pointed out that a large part of the foreign trade of Germany is carried on through Dutch, Belgian, and other ports. The extent to which it is so has been revealed, in the case of the exports from Germany to Great Britain, by the issue in recent years of the returns relating to the consignment trade of the United Kingdom (see p. 602), from which it would appear that not much more than half the value of consignments from Germany to this country came to us direct from German ports.[2]

[1] A railway connection between Innsbruck and Augsburg is now (1910) being made by this route. It will have only a single track, and will have many sharp curves and gradients up to 1 in 28·5 (3½ per cent.).

[2] In 1906 the value of German consignments that came to Great Britain direct from German ports was £32·27 out of a total of £59·91 millions, or 54 per cent. Of the remainder 30 per cent. passed through Dutch and 11 per cent. through Belgian ports—a clear proof of the greater importance of Rotterdam than Antwerp to Germany in respect of its British trade. Rather more than 1 per cent. reached us through French ports.

SWITZERLAND

601. **From a commercial point of view this little country is in some respects very remarkable.** With little coal and little iron, it is pre-eminently a manufacturing country in the modern sense of the term, manufactured articles forming the bulk of its exports, raw materials and food supplying the bulk of its imports. Situated in the heart of Europe, it sends its silks and cottons and its watches to the United States, Canada, and South America, the British and Dutch East Indies, China, Japan, and Australia. **Even to the United Kingdom it has** managed in recent years to **export cotton manufactures** (chiefly embroideries) of one kind or another to the value of more than **one million sterling.**

602. A land of mountains, a land in which **five-sevenths of the surface is divided between the Alps and the Jura**, it has a population as dense, on the whole, as that of Ireland, and there is not a single district in the most mountainous canton in which the density of population is as low as in the county of Sutherland.

603. The nature of the surface presents great **obstacles to internal communication** between the populous midland tracts and various parts of the more sparsely-peopled region, and also to communication with the frontier countries on the east and south. **Not till the nineteenth century was there any carriage-road across the Alps**, but now the Swiss Alps possess some of the finest mountain roads in the world. The **first** constructed was that made by Napoleon **across the Simplon** for the passage of his 'cannon' from the valley of the Upper Rhone to the banks of Lake Maggiore in Italy. This was completed in 1805, and by the year 1880 the road **across the St. Gothard** between the valleys of the Reuss and Ticino, and those across the **Bernardino, Splügen, Maloja, and Julier passes** had been added (see map, pp. 276–277). Of those subsequently constructed, the most important perhaps are the **Albula** and **Bernina** pass-roads. The St. Gothard road, for a long time the most important of all on account of the direct communication which it establishes between the most populous parts of Italy (with Milan as the chief centre), Switzerland, and Germany, has now been almost entirely superseded by the railway which pierces the **St. Gothard** group in a **tunnel** nearly ten miles in length (completed in

1882). By means of this railway the continental ports on the North Sea have been brought to within a distance of three days for goods traffic from ports on the Mediterranean. The Bernardino, Splügen, Julier, Albula, and Maloja passes all serve to bring the Rhine valley by way of Coire into connection with Milan, the first by way of a tributary valley of the Ticino, the others by way of Chiavenna (the 'key-town,' from Latin *clavis*, a key), the east side of Lake Como and the bridge of Lecco; but the Splügen is the only one that leads direct to Chiavenna, the Julier and Albula leading first into the Engadine and thence across the Maloja to that town. Till 1903 the St. Gothard was the only one of the great Alpine tunnels (575) constructed within Swiss territory, but in that year a tunnel, 4⅜ miles long, under the Albula pass, leading from Coire to the Engadine, was opened; and another 12¼ miles long, under the Simplon (Brig to Iselle), was opened for general traffic on June 1, 1906. The Simplon tunnel has much easier gradients in its approaches than either the St. Gothard or the Mount Cenis tunnel. Its highest point is only about 2,300 feet above sea-level, or 1,070 feet above the Lake of Geneva, while the summit of the St. Gothard tunnel is 3,785 feet above sea-level (2,350 feet above the Lake of Lucerne). It reduces the distance between Milan and Paris to 519 miles as compared with 559 miles by the St. Gothard route. The Lötschberg tunnel, 9 miles long, through the Bernese Alps connecting the Lötschental, which opens on the Rhone valley a little below Brig, with the Kandertal and Thun, will greatly shorten the Simplon route to the Rhine valley and the north of France. It is expected to be completed in 1911. The Albula tunnel is adapted only for a narrow gauge line, partly on the tooth-wheel principle. See also **978*b*, 981**.

604. The climate of the Swiss midlands allows of the same **crops** being grown as in the adjoining parts of France and Germany. **Wine** is produced most abundantly and best in quality in the south-west (Vaud and Neuchâtel). On the whole, however, the moistness of the climate, due to the mountainous character of the country together with the exposure to moisture-bearing winds on both slopes of the mountains, causes Switzerland to be better adapted for pasture-grasses than for the growing of food-crops, wine, and fruits. Of the total area, exclusive of waste land and forests, about 70 per cent. is used for cattle-rearing, less than 20 per cent. for the growing of cereals, less than 10 per cent. for potatoes, mangolds, and industrial plants, and only about 1 per cent. is under the vine. Hence, among the industries of this class, **cattle-rearing** alone yields a considerable surplus for export. Besides **cheese** and **condensed milk** there is a large export of breeding-stock belonging to races of cattle for which Switzerland has a high reputation as well as of cattle for fattening, but this is balanced by a large import of fat cattle chiefly from Italy and Austria. When one takes into consideration the requirements of the large manufacturing population, as well as that arising from the attractions of Switzerland as a holiday

resort,[1] it will be seen that the country must be dependent to a large extent on imported cereals. Nearly half of this import is derived from Russia either by way of Marseilles and Geneva or Genoa and the St. Gothard, the remainder from North and South America, and to a small extent from adjacent European countries. Among **mineral products**, asphalt (**409**) and hydraulic lime are the only ones of importance for export. Salt is worked at Bex in that part of the canton of Vaud above the Lake of Geneva. A trifling quantity of iron ore is worked in the Jura (at Délémont or Delsberg). It has been proposed to smelt electrically ores known to exist in the Bernese Oberland above the lake of Brienz at the height of 6,500 feet above sea-level, but it does not seem likely that the quantity of pig-iron obtainable from these deposits would be much above 1,500,000 tons.

605. For the prosecution of its **manufacturing industries** and handicrafts Switzerland, though suffering from the disadvantages above indicated, has certain advantages of its own, the principal being the **abundance of water-power** and of cheap **skilled labour**, to keep up the quality of which the government has done so much in the way of providing for **efficient technical education** (**30**). To these may be added the advantageous commercial position of Switzerland, more particularly of northern Switzerland, which lies at the intersection of the great routes connecting northern Italy with the middle Rhine valley and the lower Rhone valley with that of the upper Danube; but this advantage is diminished by the smallness of the home market. Now that production on a large scale is of so great economic importance, it is adverse to Swiss industries that a customs barrier is encountered on all sides within so short a radius. The amount of water-power in Switzerland is estimated at not less than 580,000 horse-power, or about three times as much power as is at present used in any form in Swiss industries; and the Swiss have taken a leading part in the development of their water-power by means of electricity (at Geneva, on the falls and rapids of the Rhine between the Lake of Constance and Basel at Schaffhausen, Neuhausen and Rheinfelden, at Brugg on the Aar and Baden on the Limmat, at Bern and elsewhere). The manufactures and handicrafts in which Switzerland particularly excels are those in which the value of the labour, or the whole cost of elaborating the raw material, is high in proportion to that of the material itself, so that the cheapness of Swiss skilled labour tells all the more proportionally in the final value of the product. The great height to which the Swiss machine industry has attained may be taken as evidence of the excellence of the great polytechnical institute at Zürich. Every branch of the industry is carried on, but more particularly the manufacture of textile machinery,

[1] In 1899 the capital invested in Swiss hotels amounted to upwards of 22,000,000*l*., and as significant of the importance of the holiday attractions of the country, it may be mentioned that nearly half of this capital was invested in hotels open only for the season.

electrical machinery (at Oerlikon near Zürich and Baden), and hydraulic machinery.[1] All the leading places engaged in this industry are in the commercially favoured district just indicated.

The success of this country in the **silk industry** has been largely owing to the dexterity with which cheaper materials, principally cotton, have been worked up along with the more costly silk, which, moreover, is one of the raw materials the supply of which has been greatly cheapened through the construction of the St. Gothard railway leading direct to the great silk market of Italy. In **cotton spinning**, Switzerland produces a greater quantity of **fine yarn** in proportion to the number of its spindles than any other country except England, and the **cotton fabrics** for which it is chiefly celebrated are **trimmings and embroideries.** Swiss **shoes,** which are exported even to the Argentine Republic, are not the commoner sorts, but noted for their quality and finish combined with cheapness.

605*a*. The central situation of Switzerland is one of the facts that have caused this country to be selected for the seat of several semi-official international bureaux of great importance for commerce and industry, viz. the United Telegraph Administration, the International Postal Union, the Railway Administration, the unions for the protection of trade marks and patents and of literary and artistic property, and the International Labour Office.

606. The chief centres of the **silk** industries of Switzerland are **Zürich and Basel,** the former producing mainly plain and figured fabrics, the latter mainly ribbons. The weaving is still part done by hand. The **cotton** manufactures are mainly carried on in the north-east, in **Zürich and the adjoining cantons,** but there are numerous bleaching, dyeing, and printing establishments in the canton of Glarus, in some of the deepest Alpine valleys. **Machine embroidery** and lace-work are pursued chiefly in the cantons of **St. Gall, Appenzell,** and **Thurgau,** St. Gall having been noted for its hand-embroideries (mostly on linen), as well as its linen manufactures, as far back as the thirteenth century. The embroidery machine was introduced into St. Gall in 1840, and it is since then that the industry, which is still, however, partly domestic, has grown to its present magnitude. The variety and richness of the patterns have been enhanced through the introduction of the sewing-machine about a quarter of a century later. **Watch-making** is principally carried on in the Swiss Jura, where it has been practised since the beginning of the eighteenth century, and where there is a high degree of hereditary skill now combined with the most advanced organisation. Formerly hand labour was exclusively employed in Swiss watch-making, but in recent years the keenness of foreign competition has led to the establishment of factories equipped with all the appliances necessary for making entire watches by mechanical

[1] The value of the Swiss exports under this head in 1900 was one-half more than that of the imports.

processes. The chief seats of the industry are **Locle** and **La Chaux de Fonds** in Neuchâtel, **Bienne, St. Imier,** and **Porrentruy** in Bern, but the watches are known by the name of Geneva, which is one of the chief centres of the trade in this article. The manufacture of **chemical products**, especially aniline dyes and drugs, is important at Basel, and in recent years the water-power of Switzerland has been made use of in the manufacture of aluminium (at Rheinfelden), and carbide of calcium (**464**).

607. The capital of the republic is **Bern**, on the Aar, but the three most populous towns are Zürich, Geneva, and Basel. These also have the most commanding situations commercially—**BASEL**,[1] on the German frontier at the head of the plain of the middle Rhine (**579**); **Geneva**, near the French frontier, in the narrow opening formed by the Rhone valley between the Alps and the Jura; **ZÜRICH**, the centre of a highly populous region, and a place of convergence of railways of great importance since the construction of the St. Gothard line, which runs thence southwards, and the eastern line through the Arlberg tunnel (see map, pp. 276–7).

607*a*. In transmarine commerce the chief North Sea port made use of by Switzerland is Antwerp, especially in the case of the export trade, which is mainly in relatively valuable articles, for which inland water carriage is unsuited. For much of the imported grain, however, Rotterdam is the port and Mannheim is the chief distributing centre, though the recent improvements of the Rhine no doubt enable much of it now to reach Basel. Havre and other French ports are the chief places of export of Swiss silks and watches, and Havre is the chief importer for Switzerland of raw cotton, though it has a growing rival in this trade in Bremen. Hamburg is the chief Swiss port for Central and South America, St. Nazaire and Bordeaux coming next. For the Baltic trade the chief port, as is natural, is Lübeck. For the trade of the Mediterranean and all that passes through the Mediterranean, including South American grain, Marseilles is the chief port, but in the Levant it has a growing rival in Genoa. From the returns of the consignment trade of the United Kingdom (p. 602) we now learn that Switzerland exports to this country a large value of silk manufactures and ribbons, of embroidery and needlework, watches, condensed milk, straw-plaiting, &c., and receives from this country unbleached cottons, cotton thread and yarn, woollen and worsted goods, woolwork, and a great variety of other articles.[2]

[1] On the stretch of 79 miles between Strassburg and Basel the navigation of the Rhine has been so improved that for upwards of 200 days in the year it is possible for tugs with engines of 800 to 900 horse-power to haul at one time two barges with a total load of 1,000 tons up-stream. See also **988**.

[2] In 1906 the value of the consignments from Switzerland to Great Britain was £7·9 millions, of which more than 50 per cent. came through French and 30 per cent. through Belgian ports; that of the consignments of British produce to Switzerland was £1·7 millions, of which more than 82 per cent went through Belgian ports.

AUSTRIA-HUNGARY

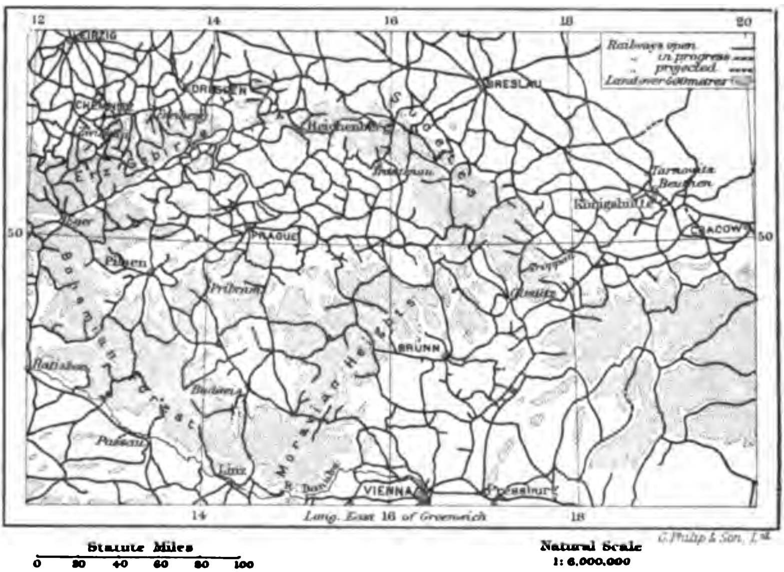
608. The Austro-Hungarian empire, exclusive of Bosnia, has an **area** almost exactly equal to twice that of the British Isles. It is divided into two nearly equal sections, the **Cis-Leithan** portion, comprising most of the outer provinces, and the **Trans-Leithan**, or Hungarian portion, comprising the inner provinces along with Transylvania and a strip of coast-line extending from Fiume to the mainland of Dalmatia. **The most populous area** of the empire is along the northern frontier, and more particularly in the north-west, where the density is from 300 to 400 to the square mile. The whole empire forms a single customs union, in which Bosnia and Herzegovina (**679**), and the independent principality of Liechtenstein (between Switzerland and Vorarlberg) are also included.

609. The **obstruction to communication** caused by some of the **mountains** upon and within the frontier has already been referred to in speaking of the communications of Germany (**574, 575**) and Switzerland (**603, 607**). The Brenner line serves as the direct route between the populous part of Bohemia and northern Italy; and that by way of Udine, in Venetia, and Klagenfurt, in Carinthia, across the Semmering Pass, on the frontier of Lower Austria and Styria, is as yet the shortest route between northern Italy and Vienna. Hitherto **no railway** has been constructed **across the Stelvio Pass** (above 9,000 feet), at the head of the valley of the Adda, the route followed by the shortest carriage road between Vienna and Milan.

609*a*. The directness of the Brenner route, which runs with comparatively slight deviations from north to south between Innsbruck and Verona, and enables the whole width of the Alps to be crossed by means of a single pass under 4,500 feet in height, would at all times have given it a high degree of importance if it had always been available. It was certainly used in prehistoric times in the trade in Etruscan bronzes and earthenware, and Baltic amber. It was one of the passes across which the Romans made a transalpine road. In the middle ages, however, it got obstructed by landslips in the narrow gorge of the Eisak above Bozen,[1] and was long in part neglected down to 1480, when it was again made practicable for wheeled vehicles. Even during this

[1] Pronounced *Bŏt'sen*.

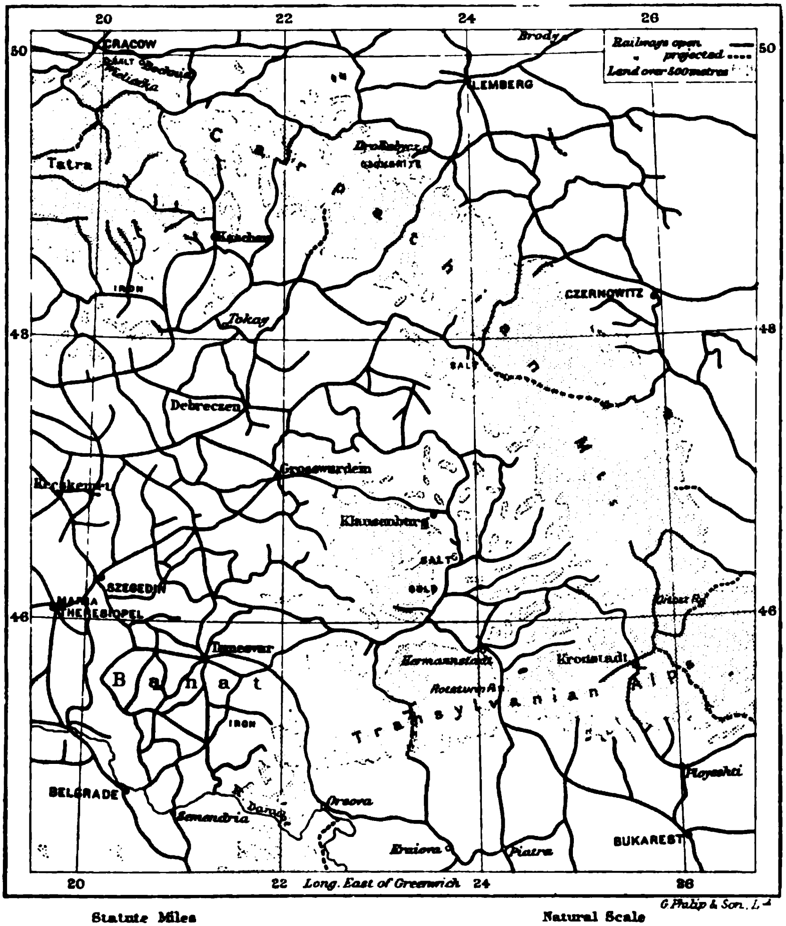
period, however, the route was not wholly abandoned. The obstructed portion was avoided, and the Brenner route joined again, sometimes from the east by way of the Pusterthal, sometimes from the west by ascending the valley of the Adige as high as Meran, and thence going north-east across the Jaufen Pass, which rises, however, to nearly 6,900 feet, and involves a descent to about 3,100 feet before the Brenner is crossed. Frequently the Brenner route was avoided altogether; the valley of the Adige was ascended to its head in the west of the Tirol, and the Inn valley was then reached by the Reschenscheideck, which is under 4,900 feet. In this case Augsburg was reached by the Fern pass (4,100 feet), a little to the west of the Seefeld (600*a*). From 1480 the Brenner route has been used continuously. A modern carriage road,



made across it in 1772, was the first of the kind made across the Alps, and the railway across it, completed in 1867,[1] was the first of the great transalpine railways. It is noteworthy that the three most populous towns in the Tirol, Innsbruck, Bozen, and Trent (600*a*) are all on this route. The last stands at the point where the valley of the Adige is joined from the east by the Val Sugana, a valley by which the Brenner route was often joined in past times by merchants from Venice; and the importance of this side valley as a line of communication is once more being shown by the fact that the railway that already ascends it is being continued across a spur of the Alps so as to form a connection with the north Italian railway system.

[1] The longest tunnel on this line, more than half a mile in length, is in the side of a mountain to the south of the Brenner.

610. Down to the present day the **Carpathian Mountains**, separating Hungary and Transylvania from Galicia, Russia, and Roumania, have much longer intervals uncrossed by rail than the Alps, but this is not because they are more difficult to cross, but because the more populous regions on the opposite sides yield for the most part similar products, and the wide intervening belt yields little but timber.



611. The **communications with Trieste**, the chief seaport of the Cis-Leithan provinces and of the Austrian empire, were till recently very defective. The line proceeding by way of Laibach and Graz across the Semmering to Vienna, and sending off a branch to Budapest, was till 1906 the only railway connection between this port and Vienna. The improvements that have since been made in the railway

connections of the port not merely with Vienna, but also with the dense industrial population of northern Bohemia and southern Germany, are stated in pars. **985*b*** and **985*c***, but it may be noted that even yet the railway does not ascend the Isonzo valley to its head but turns off to the north-east above Görz. See map, pp. 276–7.

611*a*. Since August 1, 1889, the system of **zone tariffs** for passengers has been in operation on the Hungarian State railways. According to this system the fare is increased only at intervals of several miles; on the Hungarian railways, for example (on which the system was first tried), for passengers going beyond the second station, only at intervals of 10 to 16 miles. A zone tariff was subsequently adopted also on the Austrian State railways, and on January 1, 1891, a similar system was introduced on the Hungarian State railways for goods.

612. As in Germany, **the rivers** in Austria-Hungary **form an important auxiliary to the means of communication**, and as by far the greater part of the empire belongs to the basin of the Danube, it need hardly be said that the rivers of that basin are the principal navigable streams. The **Danube** itself is navigable for steamers throughout its whole length within the limits of the empire; and notwithstanding the existence of several obstructions to the navigation the **Danube Steamboat Company of Vienna maintains a successful competition with the railways.** By river goods are carried from the western frontier to Budapest in about a day and a half, as against about one day required by rail, but the steamboat company is able to reduce the cost of carriage to a low enough point to make up in some cases for the difference in time. A serious impediment to navigation on the Danube formerly existed just where the river quits the Austro-Hungarian frontier at the rapids known as the **Iron Gate** at the lower end of a series of rocky defiles sixty miles in length, but since September, 1896, these reaches have afforded throughout a navigable channel of ten feet in depth.

Of the tributaries of the Danube, the **Theiss**, or, as it is called in Hungarian, **Tisza**, whose tortuosity has been greatly reduced by canalisation, is navigable for steamers to Tokay; the **Drave** to the confluence of the Mur; the **Save** to Sissek at the confluence of the Kulpa.

612*a*. Though the **Elbe** proper begins to be navigable only at the confluence of the Moldau, the navigation of that river may be said to begin at Prague, for the **Moldau** is navigated from that place by the steamers of the **Austrian North-West Steamboat Company, which maintains regular communication with the Middle Elbe and with Hamburg.** The importance of this route even for the trade of Vienna, where a very large part of the foreign commerce of Austria is centred, is well illustrated in the recent development of the trade in cheap furniture made at Vienna from bent wood. This commodity, which is now sent to the most distant markets of the world, and is shipped to

western Europe, America, and Australia, from Hamburg, can be sent to that port by the Elbe for *8s.* per 100 kilos (one-tenth of a ton), and the competition of the Elbe route has reduced the cost of carriage by rail to *4s.* or *5s.*

613. As to **climate**, the inner lowlands are more especially subject to those extremes of temperature which become more characteristic as we go eastwards. With the exception of the maritime tracts, even the **warmest parts of the empire** have at least two months in the year in which the mean daily temperature is under the freezing point, and all the lowlands of the Hungarian section have three or four months in which the mean daily temperature is above 68° F. **North of the Carpathian Mountains** the summer **temperature is more moderate**, and in the eastern part of the empire it is only within that system that a summer temperature lasts long enough for the cultivation of the vine. On the **pusstas**, or vast Hungarian plains east of the Danube, so great is the summer heat, and so rapid consequently the evaporation, that though there, as in most other parts of the empire, summer is the season of greatest rainfall, these plains, which in winter are a succession of morasses or storm-swept snow-wastes, present during the hot season the appearance of withered deserts.

614. The distinguishing features of surface and climate of the **Cis- and Trans-Leithan** sections of the empire cause them to differ also in their **characteristic productions**. In both the area under corn crops is very much greater than in the British Isles, but in the **Cis-Leithan** or Austrian section, the chief **corn crops** are **rye and oats**, in the **Trans-Leithan**, or Hungarian, **wheat and maize**. The latter section, with an area only about $\frac{1}{30}$ larger than that of the United Kingdom, has had in recent years about four times as great an area under wheat. Relatively to acreage the produce of wheat was till lately less than one-half of that of the United Kingdom, but the great demand for Hungarian wheat and flour (**152**) has stimulated Hungarian agriculture, with very satisfactory results as regards the methods pursued and the outturn. Manure is becoming more largely used. Among other kinds, that derived from basic slag (**423·11***e*) has been employed with considerable success. The consequence is that the average yield per acre of Hungarian wheat has greatly risen of late years. Agricultural machinery is also more largely used, small cultivators uniting to purchase machines. The great majority of landed properties in Hungary, it may here be stated, are under 45 acres in extent. Great attention has been paid in recent years to improving the breeds of the more important domestic animals, including the pig. In the Alpine provinces of Cis-Leithan Austria the relative number of cattle is larger, for cattle-rearing is pursued as in Switzerland (**604**). In the production of wheat the Austrian Empire as a whole ranks third among European countries.

615. Among other agricultural products of both sections of the empire are sugar-beet, wine (**183, 185**), hops, tobacco, flax, and hemp.

Sugar-beet is grown chiefly in the Austrian section, **most abundantly on the cretaceous rocks of Northern Bohemia**, and the same province is noted for its **hops** (188). **Wine** is grown chiefly on the slopes of the Alps of the southern Alpine provinces, and on the Hungarian hills west of the Danube. In the fertile district of the **Banat**, in the south-east of Hungary proper, even a little **rice** is grown along with abundance of wheat, maize, and fruit. As to **silk** production, see **228**.

The tables on pp. 578, 607, and 624 show the importance of the **forests** of the empire.

616. The **minerals** of the empire are both varied and abundant. **Coal and iron are both plentiful, but** the chief deposits of these two minerals are **widely separate from one another**, and those of **iron ore** are **in the very heart of the Alps.** True coal is mostly found in the provinces of **Bohemia, Moravia**, and **Silesia.** In Bohemia the principal fields lie to the north-west of Prague and in the neighbourhood of Pilsen, in Moravia near the north of the province. In the Alpine provinces the amount of coal is insignificant, but **lignite** (373) abounds among the recent tertiary rocks in the east of the Alps, and especially in the **Styrian valley of Kainach**, which opens from the right into that of the Mur below Gratz. In northern Styria, at **Eisenerz**, a little to the south-east of the northerly bend of the Enns, is the chief Austrian deposit of **iron ore.** The Erzberg, that is, 'Ore mountain,' situated at this place, is almost one entire mass of an iron carbonate, and the ore, which has been mined for 2,000 years, is obtained from open-air quarries. More valuable kinds of iron ore (limonite and siderite) are produced in the north-east of the neighbouring province of **Carinthia, which ranks next to Styria** in the production of iron ore. The smelting of iron is carried on most largely in the same two provinces, and next to these in the northern coal-yielding provinces, where much foreign ore is smelted.

617. Salt is abundant in the north-western Alpine provinces (in the **Salzkammergut**, in Upper Austria, at **Hall** in northern Tirol, below Innsbrück, and at **Hallein** in Salzburg, above the town of Salzburg); but the richest salt-mines of the empire are those of **Wieliczka**, in the west of Galicia, near Cracow. In the Trans-Leithan section of the empire, the province of **Transylvania** is very rich in salt, which at many places crops out on the surface as rock salt.

617*a*. The valleys of the last-mentioned province are likewise rich in **gold**, which is produced more abundantly in Austria-Hungary than in any other European country. **Silver**, likewise, is largely produced, though Austria is now far surpassed in the production of this metal by Germany, and the principal locality of production is no longer the Erzgebirge, but the neighbourhood of Pribram, east of Pilsen, and accordingly more **in the heart of Bohemia.** Both gold and silver are also produced at **Schemnitz** in northern Hungary. **Idria**, in the west of Carniola, yields **quicksilver.**

618. The regions in the neighbourhood of the chief coal supplies, northern **Bohemia**, **Moravia**, and **Silesia**, which have long been the principal **seats of manufacturing industry**, have naturally remained so under the changed conditions due to the application of machinery. **Woollen and linen manufactures**, both sustained at one time principally by local supplies of the raw material, now make great demands for raw material on distant countries. **Cotton** and **jute** manufactures have likewise sprung up (315). **Woollen manufactures** flourish chiefly at **Reichenberg**, in the extreme north of Bohemia, at **Brünn** and **Iglau** in Moravia, and **Troppau** in Silesia. **Trautenau** in Bohemia is noted for its **linen yarns**. **Pilsen** and many other smaller towns carry on a variety of textile industries.

619. The **working of iron and steel** in all forms is chiefly carried on in the neighbourhood of the principal iron fields. First in rank among the towns specially devoted to these branches of industry is **Steyr**, in Upper Austria, a town that has direct railway communication chiefly by the valley of the Enns, with Eisenerz and the northern side of the Erzberg (616): and second, perhaps, is the larger and otherwise more important town of **GRAZ**, which lies in a small expansion of the valley of the Mur, and which, besides having direct railway communication with the southern side of the Erzberg, can obtain supplies of lignite from the neighbouring valley of the Kainach (616). **Klagenfurt**, the capital of Carinthia and the nearest important town to the iron region of that province, has likewise a large iron industry, besides manufactures of other kinds.

620. **Glass-making**, which was introduced into Bohemia from Venice in the sixteenth century, and for which **Bohemia** has acquired and long retained a high reputation, especially as regards the treatment of crystal, is pursued chiefly at **Eger** and other places near or belonging to the **Bohemian Forest**, where the geographical conditions are as favourable to it now as they always have been. The forest supplies not only fuel but potash (451), and since silicate rocks have come to be used in glass-making (451) this material is also obtained from the forest, and coal, as already indicated, is at no great distance. **Porcelain** is made, among other places, near Karlsbad, on the river Eger, where there are deposits of **kaolin** (444).

Sugar refining is carried on in Bohemia and Moravia in the districts where the beet is grown (615). **Vienna** and **Pilsen** are noted for their **beer**.

621. Manufactures of various kinds are carried on in the three most populous towns of the empire, Vienna, Budapest, and Prague. **VIENNA**,[1] situated on the Danube at the point where it quits the narrow valley between the Alps and the northern tableland, is the capital of the empire and the chief centre of trade. Among its manu-

[1] Population, including suburbs, nearly 1,700,000.

factures, those of silks, machinery, and fancy wares may be singled out as most worthy of note. **BUDAPEST**,[1] lower down on the Danube, in a position strengthened by the spurs of the last hills skirted by the river before it traverses the Hungarian plains, is the capital of the Trans-Leithan section of the empire and the centre of trade for the surrounding plains and lowlands. Flour-milling is its most important manufacturing industry. **PRAGUE**[2] is the capital of Bohemia, a province which is marked out by nature in the most unmistakable manner, and in which a dense population has existed from a remote period, and in that province it occupies a situation which a variety of physical features combine to fix as that of the political and commercial centre. It lies near the middle of the province, at the head of navigation on the Moldau for boats of considerable size, about the place where the steeper ascent to the highlands of southern Bohemia begins, and at the meeting-place of roads from gaps in the mountains on the east and west (**114**, **574**).

622. In the **Trans-Leithan section** of the empire **manufacturing industries** in the modern sense of the term are **scarcely developed at all except in the capital.** This section being, as we have seen, mainly agricultural, and a region in which even agriculture has only recently begun to advance under the stimulus of cheapened communication with distant markets, does not even yet afford a market for manufactured products at all corresponding in value to its population. The peasants are poor, and wear chiefly coarse woollen fabrics, strong enough to last for years or almost a lifetime, and many of them simply sheepskins with the wool turned inwards. But there can be no doubt that advancing agriculture will steadily increase the requirements of the people.

623. Seaports. For distant commerce by sea Austria-Hungary has only two ports, Trieste and Fiume, the former belonging to the Cis-Leithan, the latter to the Trans-Leithan section of the empire. Together they carry on less than one-third of the foreign commerce of the country. **TRIESTE**, at the head of the gulf of the same name opening off the Adriatic, had the privileges of a free port till July 1891, when bonded warehouses were opened. Its new harbour provides accommodation for vessels drawing as much as 30 feet alongside of piers. It is the seat of the **Austrian Lloyd**, a company constituted in 1832 with the same purposes as the English Lloyd,[3] but organised also as a steamship company in 1836. It is now one of the three principal shipping companies belonging to the Mediterranean, the others being the French Messageries (**548**) and the Italian Navigazione Generale.[4] Its trade is principally carried on with the East Indies, Venice, Turkey,

[1] Population, above 600,000. [2] Population, above 300,000.

[3] That is, for the registration of ships and their classification according to seaworthiness.

[4] The headquarters of which are at Genoa.

Egypt, and the Levant generally. **Fiume**, at the head of the stormy Gulf of Quarnero, about 1880 had but a small trade, but through the improvements made in the port by the Trans-Leithan government, it has since become the chief place of shipment of Hungarian grain and flour as well as the seat of a large export trade in timber and other products. The largest vessels can lie alongside of the town quays. Its import trade is of less magnitude. It is the headquarters of the Adria Steamship Company, which receives a large subvention from the Trans-Leithan government. **Pola**, in the south of Istria, is the naval station of the empire; **Zara**, **Sebenico**, **Spalato**, and **Cattaro**, on the Dalmatian coast, are mainly fishing towns, their trade being limited through the want of communications, though all except the first have admirable natural harbours.

624. Of the **inland towns** of the empire, besides those which have been already mentioned as seats of manufactures, the chief are **Cracow** in the west, **LEMBERG** in the east of Galicia, **Szegedin**, **Temesvar**, and others on the Hungarian plains, **Klausenburg** and **Kronstadt** in Transylvania. Cracow and Lemberg both lie on the great route from west to east along the northern base of the mountains of central Europe, and at places of divergence of important roads across these mountains. **Szegedin**, the town next in population to Budapest in the Trans-Leithan section of the empire, stands on the Theiss a little below the place at which that river is joined by its greatest tributary, the Maros. Having been almost wholly destroyed by an overflow of the Theiss in March 1879, it has been protected by the construction of embankments on a still larger scale than those which formerly confined the river at this place.

624*a*. It has already been indicated (**612*a***) that part of the Austrian exports pass through Hamburg, which is only what is to be expected, even apart from the advantage of water carriage by the Elbe, when one considers that Bohemia is much nearer Hamburg than Trieste. The rail distance of Prague from Hamburg is 407 miles and that by an easy route, whereas the shortest rail distance to Trieste, by a difficult mountainous route, is 541 miles (**985*b***). The shorter sea distance from Hamburg to Great Britain may tell in favour of Hamburg, even with Viennese exports, though Vienna is 624 miles from Hamburg and only 321 miles from Trieste. In fact, only a small portion of the Austrian exports reaches us direct. The nature of the exports also helps to account for this. The chief article is refined sugar—mainly from Bohemia. The next in value is eggs—a commodity demanding rapid rail transport. Among others of importance are high-class leather manufactures, jewellery, flint and other glass, all of which will stand long railway transport costs.[1]

[1] In 1906 the total value of the goods consigned from Austria-Hungary to Great Britain was £7 millions, of which only £1·2 millions came direct. Of the remainder goods to the value of £3·74 millions came through German, £1·02 through Dutch, and £0·99 through Belgian ports.

RUSSIA

625. The **surface** of Russia, though mainly made up of one **vast plain**, and thus presenting scarcely any of the obstacles to communication such as we have had chiefly to consider in the case of the countries already treated, offers difficulties of another kind, and these natural difficulties, together with other causes, have prevented Russia from acquiring to this day anything like adequate facilities for transport, and especially by land. The **marshy** character of a large part of the surface and the **want of road-making material** (both stone and wood being entirely absent throughout large areas in the south) have stood in the way of the construction of roads. For half the year the substitute for roads is, as usual in such regions, tracks formed by the repeated passage of wheeled vehicles, and apt to be rendered scarcely passable by bad weather. In winter a better substitute is found in the use of sledges.

626. The deficiency of roads is to some extent made up for by the abundance of the **natural waterways** and the ease with which they can be and have been connected by canals. The great majority of the rivers are navigable nearly to their source, many of them for a great distance by steamers. In all there are 51,800 miles of inland waterways in Russia, less than 1,400 being artificial. Nevertheless, this means of communication is attended by **various drawbacks**, which will best be illustrated by a few particulars.

626*a*. From Tver, the head of steam navigation on the **Volga**, the direct distance from the mouth of the river is less than 900 miles, the distance by river is about 1,650 miles. Before the introduction of steam **navigation so slow** was the rate of progress that it was a matter of months to accomplish the distance between Tver and Astrakhan, and even since steam navigation has been introduced the average rate of speed of the post and passenger steamers down stream is only about 14 miles an hour, up stream about 11½ miles, so that if these rates were steadily kept up through the whole route, about five days would be consumed in the passage between those two places in descending the river, about six days in ascending. The time taken by a tug in drawing a train of cargo-boats must of course be much longer.

626*b*. Further, no Russian river-port is on an average free from ice for more than ten months in the year. **Warsaw**, the head of steam navigation on the Vistula, has on an average 305 days in the

year ice-free; **Kherson,** at the mouth of the Dnieper, in the latitude of La Rochelle in France, only 280 days; **Astrakhan,** in about the same latitude, only 264 days. **Ribinsk,** the chief grain-port of the Upper Volga, has only 219 days ice-free, **St. Petersburg** 218, and **Archangel,** at the mouth of the Northern Dvina, only 177 days or less than half the year. For other examples see the accompanying map.

626*c*. On the **Dnieper,**[1] the principal waterway to the Black Sea, rocky **rapids** impede the navigation for a distance of 28 miles on that part of the river which flows from north to south (between Alexandrovsk and Ekaterinoslaf) in the great bend which the stream makes to the east. Though artificial channels have been constructed since 1858 to avoid these rapids, 'they are regarded by all vessels, except undecked flat-bottomed barges, as mere traps, and carefully avoided in descending,' and no cargo boats ever ascend. **Rapids also** impede the navigation of the **Dniester**[1] **and Bug,** and, above St. Petersburg, the much more important navigation of the **Neva.** The navigation of the **Volga,** again, is liable to be obstructed by **sandbanks** which accumulate rapidly where any impediment occurs in the way of the current.

626*d*. There are other drawbacks still. The **Volga,** which with its tributaries affords more than 7,000 miles of inland navigation, does not furnish any direct connection with the ocean. **Goods intended for the sea are landed at Tsaritsin,** at the point where the river turns south-eastwards to the Caspian, and are transferred by rail to the **Don,** a river that can be **navigated only by steamers of very shallow draught.** The **Northern Dvina,** a fine deep river, **flows through a sparsely peopled region,** but in one respect it may be regarded as all the more important on that account as a natural waterway, since only by such means was it possible to develop in such a region an export trade in timber and timber products, flax and other commodities, such as its waters carry.

626*e*. The inland navigation of Russia is the cause of a considerable annual outlay on the part of the Russian government, but on January 1, 1902, all charges on goods and shipping on inland waterways throughout the empire were abolished, except for such services as pilotage and the use of special appliances in ports. Many thousands of river vessels are constantly moving between the Neva and the Volga, and many of these are of more than 1,000 tons burden.[2] It is significant of the backward state of commerce in Russia generally that the total volume of traffic on the waterways, though rapidly growing, is still comparatively small.[3] Of the projects for new canals now being urged forward the most important perhaps is that for a **canal between the Don and**

[1] Properly Dnyepr and Dnyestr.

[2] The total capacity of vessels used on the inland waterways of European Russia in 1899 was 8,640,000 tons; of those on the Volga basin, 4,150,000.

[3] The total quantity of goods transported on Russian rivers increased from 23·3 to 30·4 millions of tons in 1894–99, but is still considerably below the amount carried on the inland waterways of the British Isles, Belgium, or Germany.

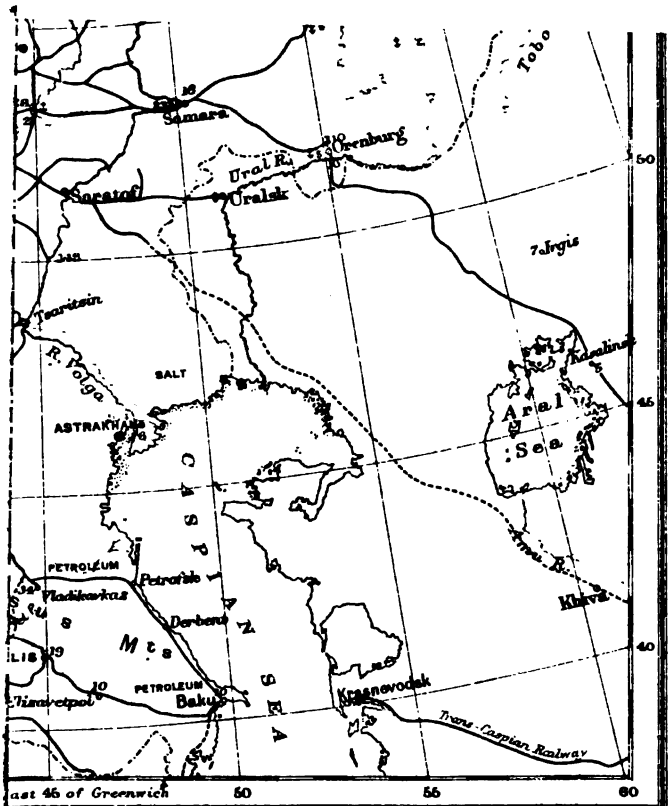
the Volga, to put an end to the interruption that now exists between the navigation of the Volga and the outside world.[1]

627. The extent of the water communication in Russia helped to delay the laying of **railways.** Down to the close of the Crimean war there were only four railway lines in the country. The accompanying map shows the subsequent railway development. The principal difficulties in the way of railway construction presented by the physical features have been due to the rivers, many of which have required long bridges. The ascent of the Ural Mountains is so gradual that on the older line between **Perm,** at the head of steamboat navigation on the Kama, and Tyumen in Siberia it is scarcely perceptible. On the southern line also the gradients are easy. This line running from Samara by Ufa and **Zlatoust,** the centre of the iron industry in the Urals, is now continued eastwards as the Trans-Siberian Railway (**702**). It begins its most rapid ascent a little to the east of Zlatoust, but the steepest gradient is only 1 in 100 and the maximum curve has a radius of 350 yards. A short tunnel hereabouts is the only tunnel on the entire route between the Baltic and Irkutsk.

628. Regarding the **climate** of Russia, the reader may be reminded that the country lies in that part of Europe where the extremes of temperature are greatest and the rainfall on the whole least (**36, 470**). About half the entire area, in the north-east, east, and south-east, has a total rainfall for the year of less than 20 inches. On the whole, the extremes of temperature are greatest and the rainfall least in the south-east—say beyond a line indicated by the position of Odessa, Saratof, and Orenburg (see map).

629. The nature of the climate puts a limit to cultivation both in the north and the south-east, and the whole of the **arable land of Russia proper** makes up **only about 26 per cent. of the surface.** A **northern zone,** the tundra, with only **reindeer pastures,** is followed to the south by a **second zone** chiefly occupied by **vast forests,** that again by a **third,** in which forests give place more and more to **agricultural land,** and finally disappear altogether. The region of **black-earth,** a soil of unsurpassed fertility which is spread over southern Russia in larger or smaller patches from the frontier on the south-west to the hills west of the Volga, is that on which by far the greatest quantity of the corn crops of Russia proper (excluding Finland and Poland) are grown. Altogether this soil is estimated to cover one-fifth of the total area of Russia proper, but a large part of this area in the east extends into the region of those **steppes** which are so arid in climate as to be habitable only by nomadic tribes (Tatars and others). Formerly these tribes were unsubdued marauders whose plundering incursions prevented the extension of Russian agriculture southwards, but nowadays the part of the black-earth zone adapted by its climate for agriculture is

[1] The frequently mooted project of a Baltic and Black Sea ship-canal has never taken definite shape.



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acquiring a larger and larger share of the agricultural population of the country. **Poland**, which has a separate administration from Russia proper, lies mainly outside of the black-earth zone, but has long had a much **better system of agriculture than that of Russia.**

630. Agriculture in Russia is practised under conditions in some respects peculiar. **Down to 1861** the majority of the **peasants were serfs** attached to the properties of large landowners, but since the emancipation of the serfs in that year the land has become in a large measure the property of the peasantry, and especially in the arable districts. But this peasant property is for the most part not held individually, but is the common property of the ancient village communities or *mirs*, and is subject to re-division among the members of the *mir* according to rules which vary in different places. The meadows are re-divided among the members every year before the grass is cut, so that each family gets an equal quantity and quality of hay, but the plough-lands are now re-divided by law only once in twelve years. The existence of these communities operates to some extent as a check upon migration and emigration, since a member of a *mir* loses his rights by a prolonged absence; but this fact in some parts of the country has been unable to counteract the attractions of towns where manufacturing industries are springing up, or of regions where the fertility of the soil makes agriculture more profitable than in the district quitted.

631. The tables of exports and imports in the Appendix show that **Russia is in the main an agricultural state,** but do not serve to give any idea of the relative importance of different crops in the production of the country. **Rye** is produced to an amount about four times as great as **wheat**,[1] and the second of the corn-crops in importance is oats. **Wheat** and most other grains are **exported chiefly from the Black Sea,** but it may be mentioned, as an additional illustration of the importance of the Russian waterways, that a great deal of the wheat of the eastern provinces, and even those pretty far south, where wheat is principally grown, is carried by the Volga up to **Ribinsk,** 'the Russian Chicago,' and thence forwarded by water, or in winter by rail, to St. Petersburg. As to Russian **flax, hemp, sugar-beet,** and **wine,** see pars. **192, 197, 190,** and **183** respectively. Cigar **tobacco** is grown round Samara.

632. Though agriculture and forestry form the basis of by far the **greater part** of the export trade of Russia, the **mineral wealth** of the country is enormous, and its mining and manufacturing industries are rapidly extending.[2] Coal and iron are both abundant. **Coal** is found

[1] In the production of wheat Russia vies with France in amount.

[2] Russian mining, manufacturing, and shipping have been stimulated by highly protective duties and other forms of government encouragement, more particularly since about 1880; and no country in Europe increased its production of coal and iron so rapidly as Russia in geometrical ratio in the last decade of the nineteenth century. In 1891 the total production of coal in Russia was 6·2 million tons; in 1908, 24·4 millions. As to pig-iron, see par. 398.

principally in four localities, (1) **west of the Ural Mountains** in a district to which a branch line proceeds northwards from the Perm-Tyumen railway, (2) in a district to the **south and south-west of Moscow,** (3) **in the south-west of Poland,** and (4) **in the valley of the Donets,** a right-bank tributary of the Don. The last-mentioned field is the largest of all, covering altogether an area of 10,500 square miles—not much less than the aggregate area of the coalfields of the United Kingdom (376). Lying, however, in a sparsely peopled district, it began to be opened up only late in the nineteenth century.[1] In central Russia and the Volga basin generally the principal fuel now used is the residue of petroleum, now one of the chief commodities conveyed on that river and its tributaries. **Iron ores** are obtained not only in the district of the **Urals** already referred to (627), but also in several districts to the **south of Moscow,** in the **south-west of Poland,** and now most abundantly at **Krivoi Rog,**[2] about 100 miles N. by E. of Kherson, where there are estimated to be in all 82 millions of specular iron ore and red hematite. Near Kerch, in the east of the Crimea, there are estimated to be about 700 million tons of inferior ores similar to those of Luxemburg. It is in southern Russia that all branches of the iron and steel industry are most rapidly developing.[3] Blast furnaces and iron and steel works of various kinds are increasing in number at **Mariupol, Yuzovka,**[4] **Berdiansk,** and elsewhere on the Sea of Azov. Berdiansk is the most important seat of the manufacture of agricultural implements in Russia. **Krivoi Rog** is also becoming a great producer of pig iron. **Briansk,** west of Orel at the head of navigation on the Desna, is the seat of a large government ordnance factory, and **Tula,** south of Moscow, of one of small arms. **Gold, platinum,** and **copper** are found in the neighbourhood of Ekaterinburg, **east of the Urals; mercury** in the west of the government of Voronezh (near Nikitovka); **salt** in the area below sea-level, north of the Caspian, and in the Crimea—in both districts chiefly from brine-lakes. The principal brine-lakes are those of Baskunchatski and Elton, in the Caspian region. (See maps, pp. 312–3, and p. 281.)

633. The **textile industries** are advancing with great rapidity, and factories are rapidly superseding hand labour in the districts in which such industries have flourished longest as handicrafts, namely in Moscow and the populous district round, and in the Polish and Baltic provinces. As a manufacturing town, **LODZ,**[5] in Poland, has advanced with extraordinary rapidity, mainly through the rise of textile factories.

[1] Production of this district, about 1885, 750,000 tons; in 1901, 11·1 million tons (more than two-thirds of the total).

[2] In 1895 this centre produced 900,000 tons; in 1899, above 2,500,000 tons.

[3] Very largely with the aid of foreign—principally Belgian—capital, attracted by the high protective duties and other forms of government encouragement, which led, however, to such over-production as to bring about a severe crisis in 1901.

[4] Or Hughesovka—named after its founder, an Englishman of the name of Hughes.

[5] Population, in 1860, 29,000; in 1897, 315,000.

In the Baltic provinces the chief cotton-manufacturing town next to St. Petersburg is **Narva**, where the rise of factories has been stimulated by the existence of **water-power**. **Cotton-manufactures**[1] are the most important of all Russian manufacturing industries, and next in order are those of **wool**. The tables in the Appendix show the **increasing percentage** value of both of these raw materials **among** Russian **imports**, and so far have the industries in these materials developed that Russia is already independent of foreign supplies of yarn except in the case of the higher numbers. Next to cotton and woollen products the most important manufactures of Russia in point of value are those of machinery, the other two great textile industries of linen and silk coming next. The linen industry of Russia, which, being nourished by the abundant local supplies of flax (**192**), furnished till about 1820 an important export, is now only slowly recovering from the blows inflicted on it by the introduction of machine-made linens in other countries. The linens, formerly coarse, though strong, are now not to be distinguished from those of western manufacture. All kinds of industries are pursued at the three chief towns of the country, **ST. PETERSBURG**,[2] **MOSCOW**,[3] and **WARSAW**.[4]

634. The principal **seaports on the Baltic** and its arms are St. Petersburg, with Kronstadt, Reval, and Riga, the first three on the Gulf of Finland, the last on a river entering the gulf to which Riga gives name. Till the middle of 1885 **Kronstadt** was the port of **ST. PETERSBURG** for all large shipping, but a canal (now admitting vessels drawing 20½ feet) was then opened through the shallow end of the gulf to St. Petersburg, and from that very year the great bulk of the shipping was transferred to St. Petersburg, notwithstanding the deficiency of its harbour accommodation. The harbour of **Reval** has also been deepened and extended, and in recent years it has rapidly developed into a great cotton-port, importing large quantities of this material direct from the United States. **RIGA**[5] is also having its accommodation for shipping improved, by the regulation of the Düna, or Western Dvina. Its port for large shipping is **Dünamünde** or **Dvinsk**, at the mouth of that river. The **minor Baltic ports** (exclusive of those of Finland) are **Libau, Pernau,** and **Windau,** the first of which (the farthest south) has a very considerable trade.

635. On the Black Sea the chief port is **ODESSA**,[6] the harbour of which, now deepened to 30 feet, being on the sea itself (east of the Dniester), is not so apt to be closed by ice as the river ports.

[1] Russia is perhaps the only country in the world which by means of protective duties, varying from 7*l*. 10*s*. 3*d*. to 29*l*. 3*s*. 3*d*. per cwt., manages almost entirely to keep out Manchester cottons. Low wages appear to aid in maintaining the Russian industry. At any rate, in the central industrial region of Russia (governments of Vladimir and Moscow) the average wages in all industries are stated to be, for men 30*s*. to 32*s*., for women about 21*s*., for boys and girls 8*s*. to 16*s*., per month.

[2] Population, nearly 1,300,000. [3] Population, above 1,000,000.

[4] Population, 650,000. [5] Population, 280,000. [6] Population, 400,000.

It is the headquarters of the Russian Steam Navigation Company. The shipping both of the port of **Nicolaief**, on the Bug, and **Kherson**, on the Dnieper, has to cross the **Ochakof Bar**, which, however, has now been so deepened by dredging that it can always be crossed by vessels drawing 24 feet; and both these ports, which are more conveniently situated than Odessa for the grain exports of south-western Russia, are now rapidly growing, to the prejudice of the last-named port. Among the minor Black Sea ports are **Akerman** (on the inlet that receives the Dniester), **Kaffa**,[1] or Feodosia, and **Kerch**,[1] the last of which had at one time a good deal of business in lightening ships before crossing the **bar at the Straits of Kerch or Yenikale.** The channel across this bar has now been deepened to 24 feet, and at present another entrance to the Sea of Azof is being made by **piercing the Isthmus of Perekop** at the north of the Crimea. **Sebastopol** since the later part of 1899 is solely a naval port. The chief ports **on the Sea of Azof are Taganrog, Azof, Rostof, Berdiansk,** and **Mariupol,** this last being the rising port of the Donets coalfield.

Astrakhan, the chief Caspian seaport, is the centre of the important fisheries of the Caspian Sea and the Volga (sturgeon, &c.—**370**). Archangel: see **626*b*, 626*d*.**

636. Among the chief inland towns besides those already mentioned are **KIEF**,[2] on the Dnieper, centre of the Russian sugar-refining, and with important leather manufactures; **Samara**, at the east end of a loop of the Volga, where the river is pushed eastwards by a limestone barrier, long important for its river and eastern land trade, now of rapidly growing importance as situated at the angle of bifurcation of the trans-Siberian railway and the line to Orenburg; **SARATOF**, lower down, on the Volga, a centre of the cultivation and manufacture of tobacco; **KHARKOF**, a centre of trade and industry; **Orenburg**, on the Ural, the starting-point of caravans to the east and south-east.

637. Large periodical **fairs** are still characteristic of the inland, and even to some extent of the foreign, trade of Russia. The chief are those of **Nizhnii-Novgorod** (confluence of the Oka and Volga), **Poltava, Kharkof, Kief**, all three in the south-west. The great fairs of Nizhnii-Novgorod, the most important of which is held annually in August, are international, Asia and Europe there exchanging products. The value of the goods sold at the fair sometimes amounts to about 20,000,000*l*. **Irbit**, east of the Urals, north-west of Tyumen, is the seat of fairs of great importance to the Siberian fur-trade.

637*a*. Of Russian towns formerly important but now decayed two are mentioned elsewhere—**Novgorod**, once the centre of a great trade in furs and other commodities (**595*c***), and the old Tatar capital of **Sarai** (**697**). Novgorod, situated on the Volkhov just below its exit

[1] See below, par. 697. [2] Population, 250,000.

from Lake Ilmen, was for hundreds of years—till it was conquered by the Moscow tsars in 1570—the seat of a principality which probably owed its independence, and in a large measure also its commerce, to the safety it enjoyed amid the marshes by which it was surrounded. By the Volkhov, Lake Ladoga, and the Neva it carried on an active commerce with the Baltic long before St. Petersburg existed. At one time its population is estimated to have exceeded 100,000, but it has now dwindled to a fourth of that number. Sarai has completely passed away.

638. **FINLAND** is a part of the Russian Empire which has, at least nominally, a separate (parliamentary) government. Its inhabitants are mainly confined to a strip on the south, and even there the density of population is small. The products are similar to those of the neighbouring parts of Russia. The capital and chief port is **Helsingfors.** **Hangö,** on the Gulf of Finland west of Helsingfors, has a rapidly growing export trade in butter. The principal ports on the Gulf of Bothnia are **Abo, Björneborg,** and **Vasa.**

ROUMANIA

(See MAPS, pp. 346–7, and 308.)

639. This country is made up of two portions, which, though very far from equal in area, must be treated separately: a section on the left of the Danube formed of the old principalities of **Moldavia** and **Wallachia**, and the **Dobruja**, on the right bank of the Danube. The former section may be described as a continuation of the Galician plateau in the northern or Moldavian portion, and of the Russian plain in the southern or Wallachian portion. The climate and products are similar to those of the adjoining part of Russia. The cultivation of wine and sugar-beet is rapidly spreading. Among the exports, **wheat, maize** and other grains rank first, but there is a growing export of oil-seeds and petroleum.[1] This last commodity is produced along the face of the Carpathians, to the north-west of Bucharest, and to the south-west of Jassy, and the production is largely controlled by an English company called the Roumanian Oil Trust. With respect to the other features of Roumanian commerce see the tables in the Appendix. With regard to communications, the effect of the barrier presented by the Carpathians has already been referred to (**610**). On the Lower **Danube** great improvements have been effected by a European commission appointed in terms of the Treaty of Paris in 1856.[2] By the last improvements, completed in October 1902, the **Sulina mouth** of the river from Braila downwards has been straightened and deepened to such an extent that it is now 15 miles shorter than it was previously, and the minimum depth at low water has been increased from 15½ to 18 feet. Vessels of 7,000 tons burden can now ascend the channel. Much dredging is required to maintain this depth, for the swift and turbid rivers that flow into it from the north, especially the **Sereth and Pruth**, sometimes **form large shoals** in it with great rapidity. As to the Danube navigation higher up, see **612**. The **freedom of navigation** for all sea-going vessels, of whatever nationality, is **upheld by inter-**

[1] The production of this commodity increased from 21,000,000 gallons in 1896 to 315,625,000 gallons in 1908. A project is entertained for improving the outlet for it by the construction of a pipe-line from Ployeshti along the route of the railway to Kustenji.

[2] Under the Treaty of London of 1883, the commission is to continue in office till April 24, 1904, and then to be tacitly prolonged for terms of three years, unless one of the parties to the Treaty proposes alterations one year beforehand.

national treaty. The principal **Danubian ports** in Roumania are **Galats**, situated at the point where the Danube on receiving the Sereth turns eastwards, and **Braila** (Ibraila), at the next bend of the river higher up. The former is the natural port for northern Roumania, the latter for southern Roumania, including Bukarest. Above Braila, the value of the Danube for Roumanian commerce is somewhat impaired by the low and marshy character of the river bank, which affords few good sites for towns.

Besides **BUKAREST**,[1] the capital, the chief inland towns are **Yassy**, the capital of Moldavia, **Ployeshti**, and **Kraiova.**

640. The **Dobruja** is made up to the extent of about two-thirds of its area of uninhabitable and unhealthy marshes, mainly belonging to the delta of the Danube. The remainder is habitable and to a large extent fertile land, but so far the province is mainly pastoral in its character. **Wool** is annually produced in it to the amount of more than 3,000,000 lbs. A **railway** from Bukarest crosses the Danube at **Chernavoda** by a bridge opened in 1895, and runs thence eastwards to **Kustenji** or Constantsa, its chief port. The port of **Mangalia** is further south.

[1] Population, nearly 300,000.

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SWEDEN AND NORWAY

641. These two countries, which were under one king from 1814 to 1905, may be suitably treated of together, because they both occupy the Scandinavian peninsula, and hence have certain **great physical features in common.**

The greater part of this peninsula is made up of a **high tableland furrowed by deep and narrow river valleys.** The surface of this tableland rises from about 1,000 feet in height in the north to upwards of 3,000 feet in the south, and, as increasing height thus takes away the advantage of a more favourable latitude, it presents everywhere a desolate aspect, almost the only vegetation being heaths, mosses, and lichens. The **lowlands** of the peninsula are **chiefly in the east and south,** and hence Norway has by far the largest proportion of tableland; its cultivable lowlands, indeed, are confined to a few valleys in the west, with a rather large area round Christiania Fjord. Hence the total area **under crops and grass in Norway,** notwithstanding that it has a more favourable climate than Sweden (36*a*), is only **4 per cent.** of the surface, as against **12 per cent.** or more **in Sweden;** and hence, too, the inferior density of population in the former country as compared with the latter.

642. The **rivers** of the peninsula are for the most part too much **obstructed by rapids** to be of any great use for navigation, but some of their valleys are long enough and direct enough to greatly facilitate communication between the more populous districts on different sides of the plateau. **A railway** has been laid from **Trondhjem,** nearly due southwards, to **Christiania,** by the valley of the Glommen and the side of Lake Mjösen, which lies to the west of an easterly deviation of the Glommen. Another railway has been laid from **Trondhjem eastwards across the tableland,** from the eastern base of which it descends south-eastwards **to Stockholm.** A third railway across the tableland, the Luleå-Ofoten (645), is noteworthy as being in a higher latitude than any other railway in the world, the greater part of its route being within the Arctic Circle. A fourth was opened on November 27, 1909. This connects Bergen with Christiania, reducing the time-distance between these places from 54 to 14 hours. It is 492½ miles in length, has 184 tunnels with an aggregate length of 23½ miles, and reaches a level of 3,700 feet.

643. Though the rivers of the Scandinavian peninsula are of little service to navigation, the **lakes** of the lowland region of southern Sweden are of high importance in this respect. Lakes Wener and Wetter, and other smaller lakes, together with the navigable portion of the Göta River, are all connected by a **ship canal** nine feet in depth, and water-communication is thus established between the opposite coasts of southern Sweden.

644. The **products** of the two kingdoms are in some respects similar, and their nature is in some degree illustrated by the tables of exports on pp. 572, 574. From those tables it will be seen that in both **timber** forms the most important of the exports. In Sweden, the forests cover about 24 per cent. of the surface; in Norway, about 25 per cent.; and **the two countries together furnish about two-fifths of the timber exported by European countries.** The timber is chiefly that of pine and fir, and is valued on account of its hardness and durability, qualities which are due to the closeness of the annual rings in consequence of the shortness of the summers. **Wood-pulp** for paper-making (437) is among the timber products of growing importance in both Sweden and Norway, and in both countries the abundance of wood has also given rise to a large manufacture of **lucifer matches.** The corn and green crops of both kingdoms are much the same as in Great Britain, but in both parts of Scandinavia oats and barley predominate. In Sweden **butter** is an agricultural export of great importance. **Dairy schools** have been established; and it may also be mentioned here, as an illustration of the importance of this industry in Sweden, that the cream-separator is a Swedish invention.

645. The tables in the appendix show the chief features of the trade of the two kingdoms. The export tables reveal in the plainest manner the **mineral wealth of Sweden,** and the extensive development of the **Norwegian fisheries.** Both countries, it will be seen, import coal, though this fuel is found in Sweden in the part of Scania (Schoonen) adjoining the north end of the Sound. In both countries the lack of coal is to a large extent made good by the abundance of the water-power.[1] The chief mineral region of Sweden, however, is in the east of the country, on both sides of the Dal River. Most important of all are the **iron-mines of Dannemora,** which have long made Sweden

[1] Now largely utilised in both countries in the manufacture of wood-pulp, carbide of calcium, &c. The Swedish government is acquiring water-powers for the electrification of the railways belonging to the state. In Norway water-power is used at more than one place directly or indirectly in the production of nitrogenous manures. By one of these processes the power is first employed in the production of carbide of calcium, which when heated is converted into calcium cyanamide or nitrolim through the absorption of nitrogen from the atmosphere. Large works for the purpose have been set up at Odde at the end of a southern arm of the Hardanger Fjord. By another process nitrate of lime and smaller quantities of nitrite of soda and nitrate of ammonia are manufactured at Notodden on Lake Hittendal, S.W. of Christiania, and conveyed thence by barges to the seaport of Skien. At Notodden 40,000 horse-power are now employed, and 200,000 horse-power are being made available at the Rjukan Fos. The total amount of available water-power in Norway is estimated at 4·8, in Sweden at 3·8 million horse-power.

famous for its iron (**513***e*). By the Luleå-Ofoten railway, opened in July 1903 (see map, p. 546), the iron ores of **Gellivara,** which contain **70 per cent. of iron**—as against 50 per cent. in the Basque ores[1] (**660**)—and the ores from the still more extensive deposits of Kiruna can now be brought down to the port of Narvik, which is always ice-free. In the southern mining region Sweden also produces **copper,** at **Falun,** west of Gefle, and **silver and lead** at **Sala,** west of Upsala.

646. Of the **minerals of Norway** already worked, the chief are **copper,** of which there are valuable mines at **Röros** in the valley of the Glommen and elsewhere, and **silver,** mined at **Kongsberg,** about thirty miles west of Christiania Fjord; **apatite** (**423·11***c*) occurs at various places near Stavanger, and a valuable deposit of **infusorial earth** (**423·16***c*) containing from 85 to 95 per cent. of pure silica near the same town. Low grade **iron ores** are known to exist in great abundance in Dunderland, at the head of the Ranen Fjord, in the province of Tromsö, about 66½° N., 14° 40′ E., and these are about to be made of economic value by crushing and magnetising. The ores are to be crushed into small fragments, the pieces rich in iron separated out by means of magnets, and then again compressed into lumps, sufficiently rich in iron to bear the cost at least of sea transport. The discovery of important deposits of iron ore near Vadsö is reported.

647. Bergen, on the west coast, north of 60°, is the centre of the Norwegian **herring fisheries,** and those of **cod** are mainly carried on in spring, on a shallow bank surrounding the **Lofoden Isles.** 'This is the emporium of the North Norwegian, his field and his shop, from which his family and house are supplied, and without it Nordland and Finnmarken would boast few other inhabitants than seals and sea-birds'[2] (**358***c*). The importance of the **whale fishery,** including the bottle-nose fishery, of Norway is indicated by the **export of train oil;** but it must be remembered that the local supply of oil for illumination thus obtained is of peculiar value in countries which have such long winter nights as Norway and Sweden. At Bergen, Christiania, and Stockholm, the shortest day is less than six hours long; at Trondhjem and Hernösand, only about four hours. (Comp **486***a* and **738.**) The necessary illuminant is obtained in Sweden by importing mineral oil, but in Norway the home-made train oil enables the inhabitants to a large extent to dispense with the imported article.

647*a*. The herring fisheries of Scania on the south-west of Sweden were at one time important, but the fish have long deserted this coast. The Hanseatic league (**595***c*) during the height of its power claimed for its members the sole right to carry on these fisheries, though they permitted others to have establishments on the coast for the salting and packing of the herrings.

[1] In the natural state. Dried at a temperature of 212° F., the Basque ores contain from 55 to 60 per cent. of iron.

[2] Sophus Tromholt, *Under the Rays of the Aurora Borealis*, vol. i. pp. 18–19.

648. The absence of raw cotton from the list of chief imports of Norway shows the undeveloped state of the textile industry in that country as compared with Sweden. The chief industrial towns in the latter country are **STOCKHOLM**,[1] the capital, **Gothenburg**, and **Norrköping**.

649. Seaports. The chief seaport of Sweden is **Gothenburg** (Göteborg)—the port most directly accessible from Great Britain and France, as well as Hamburg, from which Sweden obtains most of its coffee, and Bremen, from which it obtains most of its tobacco. **Malmö**, from its situation, naturally has a large trade with Denmark and Germany. **Halmstad**, on the Kattegat, is a rising port. On the Baltic and its arms, the chief seaports besides Stockholm are **Gefle**, **Norrköping**, **Christianstad**, **Söderhamn**, **Sundsvall**, **Hernösand**. Only ruins still testify to the former commercial importance of Wisby (Visby), on the island of Gothland.

Nearly all the towns in Norway of any importance are seaports. The chief are **CHRISTIANIA**[2] and **Bergen** (595*c*); among the others are **Drammen**, **Tönsberg**, **Christiansand**, **Stavanger**, **Christiansund**, **Trondhjem**,[3] and in the far north **Tromsö** and **Hammerfest**. The shipping table on p. 617 indicates the importance of the **wooden shipping** of Norway. This seems only natural when we consider the abundance of timber for building-material, the large quantities of bulky produce (timber, ice, and salt fish) for which low freight rates are a matter of importance, the large number of good and constantly open harbours on the coast inviting to a sea-faring life, and the scantiness of the means of subsistence on the land, of which there is so small an area available for cultivation (641).

649*a*. During the middle ages, when the Baltic trade was exceptionally important (595*a*), two Scandinavian islands, Gothland and Bornholm (the latter now in the Kingdom of Denmark) became great distributing centres, and both maintained relations with the Byzantine Empire by way of the Black Sea. This trade, in the hands of Scandinavians, attained a special degree of importance at the most flourishing period of the *vikings*, or 'men of the bays,' in the tenth and eleventh centuries, when Constantinople was well known to the Norsemen by the name of Myklagaard,[4] or 'the great city.' The trade that passed thence by way of Russian rivers converged on Wisby in Gothland, which retained its importance in subsequent times during the domination of the Hanseatic League, of which Wisby was one of the leading members. The trade that converged on Bornholm passed down the Oder and its tributaries (595*a*), and any products of the regions round the Black Sea that followed that route must have been carried

[1] Population, nearly 300,000. [2] Population, 225,000.
[3] Pronounced *Trōn'yem.*
[4] See the account of the Viking trade by Mr. Bealby in Stanford's *Compendium of Geography and Travel, Europe*, vol. ii. pp. 680–4.

up the Danube to the west of Hungary and then to the Oder through the Moravian Gate. The insular position of the two centres of trade mentioned in this paragraph was no doubt determined by considerations of safety, which have so often led to the selection of island *entrepôts* elsewhere.[1]

[1] In ancient times Rhodes, Utica (originally), Gades (now Cadiz—originally on an island, though connected with the mainland since Roman times); in modern times Ormuz, Hong-Kong, Singapore, Diu, &c.

DENMARK

650. The islands belonging to this kingdom, namely **Seeland, Fyen, Laaland, Falster,** &c., between the Kattegat and the Baltic, and the island of **Bornholm,** further east in the Baltic, are for the most part fertile and well peopled. The eastern half of the peninsula of **Jutland** likewise contains much fertile land and numerous good seaports, but the western half is largely composed of barren sand-hills, and is bordered by a line of dangerous sand-downs, without any good seaport, though the small seaport of **Esbjerg,** in the south-west, maintains a trade in cattle with Great Britain. Seeing that so much of the trade of the country is carried on with Great Britain and the western ports of Germany, the importance of having a good port on this side is obvious, and a Danish commission was appointed to inquire into the feasibility of any scheme for providing one. The commission **recommended** the construction of a **ship-canal through the Liimfiord,** in the north, and a port at its western end.

The channels separating the islands necessarily interrupt to some extent the railway communication, but the **railway-trains are ferried across the channel between Seeland and Falster,** and in that way the shortest communication between Copenhagen and Germany (Rostock) is effected.

651. The tables on pp. 574–5 show that Denmark is **essentially an agricultural and especially a cattle-rearing country.** The importance of **butter** among the exports has made the Danish legislature jealous of the reputation of this commodity, so that it has empowered the Minister of the Interior to forbid the exportation of artificial butter whenever he shall find it necessary. The import tables show how largely Denmark is dependent on foreign manufactures, but the interest taken in the development of local **manufacturing industry** is shown by the flourishing condition of the Copenhagen Institute for the Encouragement of Danish Industry. During a large part of the year the institute holds monthly exhibitions, allotting free space to exhibitors, and promotes Danish industry in other ways. The only Danish manufacturing industry that has a reputation out of the country is **glove-making,** for which the numerous live-stock of the country furnish raw material.

652. A country like Denmark cannot be expected to have many

large towns, and **COPENHAGEN**[1] has a population about ten times as large as any other in the country. Besides being the capital, it is the chief seat of industry and of commerce. The **Sound**, on which it stands, is the shortest route between the Baltic and the Kattegat, and hence the site of the town—partly on the mainland of Seeland, partly on the smaller island of Amager—is well suited for a 'merchants' haven' (Danish, Kjöbenhavn). Since 1894 Copenhagen has been provided with a free port, the harbour belonging to which has a depth up to 30 feet. This port is connected with Malmö in Sweden by excellent train-ferry steamers, and the traffic has grown with great rapidity.[2] **Elsinore**, at the northern end of the Sound, has ceased to be a place of much importance since the Danish tolls collected here on vessels passing through the Sound were abolished by international agreement in 1857. Vessels of the largest size have to make use of the **Great Belt** (between Seeland and Fyen), the deepest of the channels connecting the Baltic and the Kattegat.

The chief Danish ports on the east of Jutland are **Aarhus** and **Aalborg**, the latter on the Liimfiord.

653. The **Faroe Islands** north-west of Scotland are dependencies of Denmark, and so also is the larger island of **Iceland**. The inhabitants of both maintain themselves chiefly by sheep-rearing, fishing, and the collecting of eggs and eider-down. The inhabitants of Iceland are only about 70,000 in number, or about $1\frac{1}{2}$ to the square mile. The chief seaport of the Island is **Reikjavik**, on the southern part of the west coast.

[1] Population, inclusive of suburbs, 475,000.

[2] In 1895 the tonnage of the vessels visiting the port was 260,000 tons; in 1900, 791,000 tons; in 1909 (entered) 1,388,000 tons. In 1895–6, the ferry-traffic with Sweden amounted to 5,500 tons; in 1898–99, to 91,400 tons; in 1906, to 857,500 tons. The railway traffic from the free port increased from 52,000 tons in 1895 to 220,000 in 1900, and 319,000 tons in 1907.

SPAIN AND PORTUGAL

654. The Iberian Peninsula, which is made up of the two countries named at the head of this chapter, has, with the islands belonging to these two countries, an **area** rather less than twice as large as that of the British Isles, but a population only about three-fifths as great as that of these Islands. This population is chiefly settled round the circumference of the peninsula, so that there remains a large area in the interior with an average density about equal to that of the least densely peopled counties of Scotland.

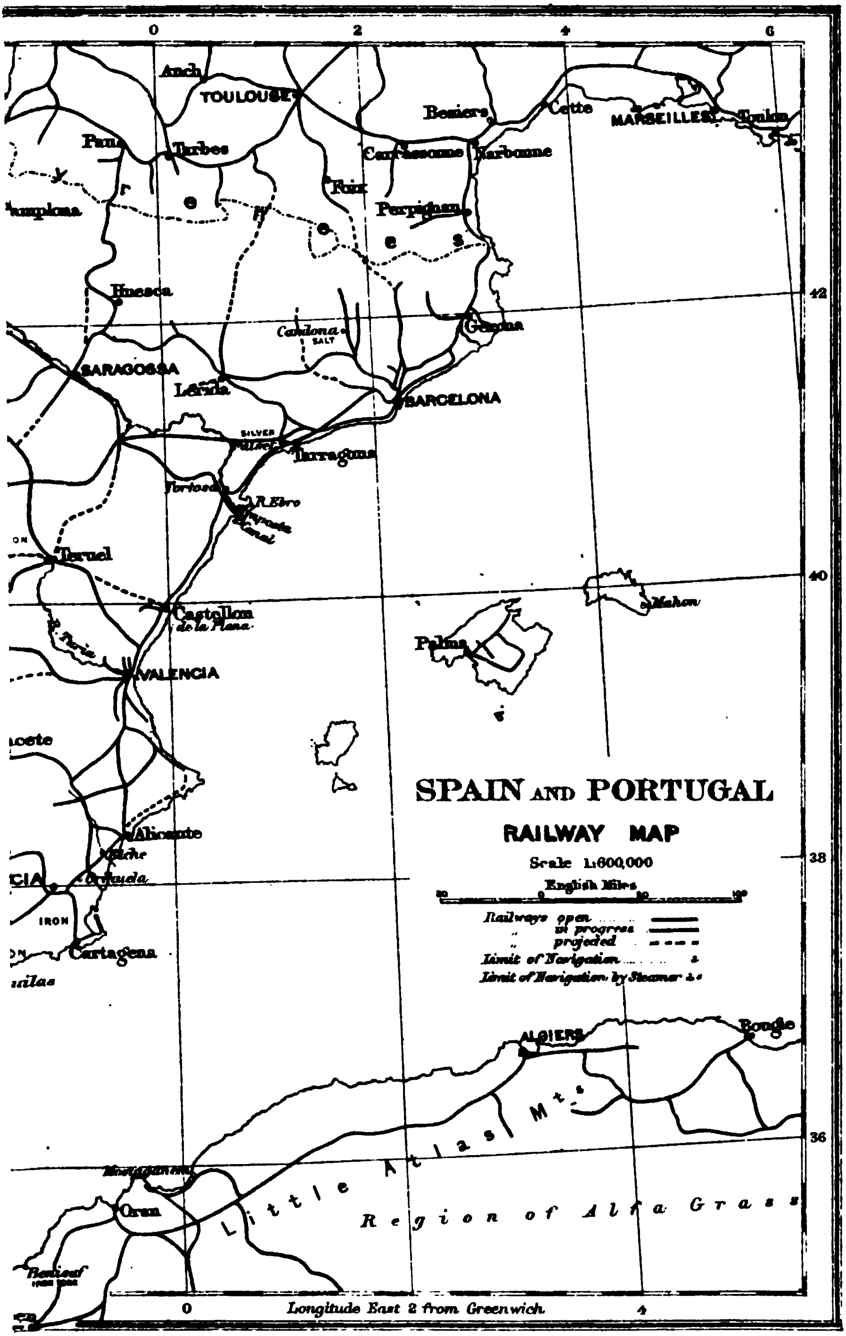
655. This low density of population is partly explained by the character of the **surface**, which is **very mountainous and unfavourable to internal communications.** The **Pyrenees** are as yet crossed by railways only at their ends, and there a difference of gauge between the French and Spanish lines is maintained as a defensive precaution, but the two countries have now agreed to allow a third rail on the western route so as to have unbroken communication between Paris and Madrid. (Compare par. 979.) The Pyrenees are continued westwards by the **Cantabrian** and **Asturian Mountains**; and though the coast **on the north** is populous and rich in seaports, **only five** of these **seaports, including Corunna, are connected with the interior by rail.** A distance of about 48 miles lies between the crossing-places of the two railways through the Basque provinces, namely that which goes to the port of **St. Sebastian,** and thence to the French frontier, and that which goes to the fort of **Bilbao.** There is an interval of 62 miles in a direct line between the crossing-place of the latter line, and of that to the port of **Santander,** a further interval of 81 miles to the crossing-place of the line to **Gijon,** and one of 84 miles to that which enters Galicia by the valley of the Sil, and then divides, sending out one branch along the Minho, and another north and north-west to **Corunna.** (See map, pp. 328–9.)

South of these mountains the greater part of the peninsula is occupied by a **tableland,** with an average height of about 2,700 feet in its northern, and about 2,600 feet in its southern half, and this tableland is bordered everywhere except in the west, by mountains and steep slopes presenting obstacles to railway construction, while the rarity of the population, and in many parts the absence of natural

resources, hold out little prospect of remunerative returns on works necessary to overcome those obstacles. At present only two railways descend from the interior of the tableland to the valley of the Ebro. One of these, after threading the famous **Pass of Pancorbo** and crossing the Ebro, divides, and sends one branch to the port of St. Sebastian and the French frontier, and a second to the port of Bilbao. The other, after crossing the Ebro at Saragossa, proceeds to the ports of **Barcelona** and **Tarragona**. Both of these ports lie to the north of 41°, and on the east side of the peninsula no other seaports are directly connected with the interior till we come to **Alicante**, which is south of 38½°. The railway along the coast to Valencia is continued south and south-westwards till it joins that which ascends from Alicante more directly to the interior tableland, and this latter line is joined by another which ascends the valley of the Segura from **Cartagena**, a little further south. The next port directly connected with the interior is **Malaga**, which is separated from Cartagena by 3½ degrees of longitude. The railway to Malaga is a branch from that which descends from the tableland to the valley of the Guadalquivir (Andalusia) through the Sierra Morena, crossing that range by the **Puerto** (pass) **de Despeñaperros**, and which after proceeding to Seville divides again into two branches, one for Cadiz in the south, and one for Huelva in the south-west. The Portuguese seaports of **Lisbon**, **Mondego** (Figueira da Foz), and **Oporto** are also connected directly with the interior tableland, but no others.

The series of **mountain ranges which cross the tableland from west to east** likewise present no little hindrance to communication. Till about 1890 they were crossed by **only one railway** line. The railway referred to proceeds north-westwards from Madrid, **crossing the Sierra de Guadarrama** by a comparatively easy pass, where the range sinks in elevation towards the opening between it and the Sierra de Gredos, and goes by Avila to Valladolid. Since about that date, however, another line, about four miles shorter, ascending the valley of the Manzanares reaches Valladolid by Segovia. Express trains to and from Paris are run by both routes.

656. The **rivers** of the peninsula, though of considerable length (three of them from two to three times as long as the Thames from its source to the Nore), add little to the means of communication. They are for the most part **too much obstructed by shallows and rapids to be navigable for any great distance**, and as their beds mostly lie in deep valleys far below the level of the tableland, they cannot advantageously be connected by canals. The **Minho** is navigable for but a short distance above its mouth. The **Douro** is navigable to the Portuguese frontier, but only by small craft; and a bar at its mouth, crossed only by a narrow, shallow, shifting, and dangerous channel, generally prevents vessels of more than 18 feet draught from ascending even to Oporto. The navigation of the **Tagus** ends



Jc. Bombay & Calcutta

within the Portuguese frontier, and that of the **Guadiana** only a few miles above the point where it begins to form the frontier between the two countries of the peninsula. The **Guadalquivir** is the most important of all the rivers of the peninsula as regards navigation. The volume of its water is tolerably constant, being maintained in winter by rain, in summer by the melting of the snows of the Sierra Nevada, the lofty range that borders its basin on the south. It can be ascended as high as Seville by vessels of 1,100 tons, and boats go up to Cordoba. The only navigable river on the Mediterranean side is the **Ebro**, which allows small craft to ascend as high as Logroño, and sea-going vessels to Tortosa. But the lower course of the river can be used by sea-going vessels only during high-water, and a small canal has therefore been cut from Amposta (above the deltaic deposits of the river) to allow of such vessels coming and going at any time. Parallel to the course of the middle Ebro, on its right bank, from a point a little below Tudela to a point about twenty miles below Saragossa, there is a canal, about sixty miles in length, which, though navigable only for vessels of 100 tons burden, is interesting as being, in part at least, one of the oldest canals in Europe. Orders were given for its construction in 1529 by the Emperor Charles V., and it is hence known as the **Imperial Canal**, but the greater part of it was constructed subsequently to 1768.

657. The **climate** is somewhat unfavourable to density of population, as well as the physical features. The total **rainfall** of the year in **by far the greater part of it is less than twenty inches**, a higher rainfall being for the most part confined to the north and west coasts. Such rain as does fall is mostly winter rain, or autumn and winter rain, and the height of summer is a period of extreme drought, especially in the southern half of the peninsula (470). The **temperature**, on the other hand, is high. The whole of the south-east from about the mouth of the Tagus to the eastern extremity of the Pyrenees has at least four months in the year with a mean daily temperature above 68° F., and the whole peninsula, except a comparatively small area in the north-west, has at least eight months with a mean daily temperature of 50° F. or more. The areas belonging to the tableland represented on the map as having the scantiest population are mainly areas of extreme drought and heat—poverty-stricken steppes, in many places covered with a barren soil, and having little other vegetation than the scanty sprinkling of pale-green grasses, herbs, and shrubs characteristic of such a soil. **Snow** is rare. During a long period of years the average maximum of snowy days at any station was found to be only 22—at a station on the upper Douro.

658. One advantage the climate of the Iberian Peninsula has. The prolonged period of high temperature allows of valuable crops being grown in quick succession wherever water can be obtained for **irrigation**. In some of the plains and valleys at the base of the tableland water has

been used for this purpose in the most admirable manner, in some cases since the time of the Romans, in others since that of the Moors. The water of the **Ebro** is being increasingly turned to account in this way, and that of the **Imperial Canal** is of more service for irrigation than navigation. The **huertas** (gardens) of **Valencia** and **Murcia**, the former nourished by the waters of the Jucar and Turia or Guadalaviar, the latter by those of the Segura; the **huerta of Elche**, in which every drop of the summer waters of the Vinalapo is used up in supplying a grove of date-palms planted by the Moors; and the **vega of Granada**, fed by the Jenil, a tributary of the Guadalquivir, are all renowned throughout Europe. At Lorca, in the south of Murcia, 'the water is in the hands of a large number of proprietors, who may or may not be holders of land, and it is sold by public auction every morning during the irrigating season. . . . Each peasant buys the amount he requires for the day, and pays for it in advance, and the proceeds are divided amongst the various proprietors of the water. The average value of a cubic foot of water per second per annum, in this place, is 2,800*l*.'[1] The total area of irrigated ground in Spain is upwards of 4,400 square miles, more than twice that of the county of Norfolk.

659. The irrigated ground is used for the cultivation of vegetables and garden fruits of all kinds—oranges, mulberries, rice, and in some places for maize. Maize, however, is chiefly grown in the rainier provinces of the peninsula—that is, in Portugal and the north-west of Spain, where it forms the staple food of the people. The more fertile parts of the Spanish tableland produce **excellent wheat**, which about ten years ago was an important export, though in recent years the import of this commodity has come to exceed the export both of wheat and wheat-flour. Among the crops more specially characteristic of Spanish agriculture are **chick-peas, onions, and garlic. Oranges**, the principal sub-tropical fruit of Spain and Portugal, are confined to land at no great distance from the coast. **Figs, almonds, cactuses, pomegranates,** and **carob-trees** are also largely cultivated, and in the southern provinces even bananas, cherimolias, and other tropical fruits. Under the protection of favourable fiscal laws, the cultivation even of **sugar-cane** has been attended with no little (though not unmixed) success in the provinces of Granada, Malaga, and Almeria. As to wine, wool, and olives, see pars. **183–85, 202, 326** respectively.

660. The **mineral wealth** of Spain is very abundant, and has been renowned for ages, though even yet it is far from being fully developed. **Iron ore** exists in immense quantity in the **Basque provinces**, and above all in the province of Biscay (Vizcaya). Bilbao (**384**), the port from which the ore is dispatched, exports a greater quantity of iron ore than any other seaport on the mainland of Europe. **Santander** and **Murcia**

[1] Higgins's *Commercial and Industrial Spain*, pp. 92, 93.

rank next in order among the provinces of Spain in the production of **iron ore**, Cartagena in the latter province being the place of export for valuable ores mined a few miles to the north-east. Large quantities are also mined in the province of Almeria (districts of Almeria and Garrucha) and near Seville, and smaller quantities in that of Malaga (near Malaga and Marbella), and also in that of Lugo in the north-west of Spain, not far from Corunna. All these places furnish ores rich in iron (the proportion varying from about 58 to 68 per cent. in the ore dried at a temperature of 212° F.[1]), and sufficiently free from phosphorus to be used in making Bessemer steel by the ordinary process (393). Other parts of Spain produce iron ores of lower quality.

660a. **Lead** is obtained at **Linares**, on the outer slopes of the Sierra Morena, south of the Puerto de Despeñapperos, and also among the mountains to the north-west of the seaport of Almeria. The great **copper**-mines are those of Rio Tinto, in the west of Andalusia; and Huelva, at the mouth of the river, is the place of export. **Silver** is found not only associated with lead at Linares, but also in other forms in several other places. **Almaden**, in the south-west of New Castille, has the principal **quicksilver** (cinnabar) mines in the world except those of the United States. **Zinc-blende** and **calamine** are also among the more important Spanish ores. **Coal** exists in large quantity, but unfortunately not in many cases in convenient situations, and the production is as yet only small. The total area of the coalfields is estimated at 5,500 square miles, of which about 1,050 square miles belong to the mountainous province of **Asturias**, or Oviedo, in which are the principal mines. A railway from the centre of the coal-mining region runs to the port of Gijon. **Bay-salt** is largely produced on the southern coasts both of Spain and Portugal, and rock-salt is also abundant. Near Cardona, in Catalonia, there is an entire mountain of this mineral. The bay-salt produced in the lagoon or estuary of the Sado, in Portugal, and exported from **Setubal** (the St. Ives of English seamen), which stands at the mouth of that estuary, is recognised as the best salt in Europe. **Phosphorite**, a valuable manure (423·11*c*), is found in large quantity in Estremadura, and is exported to Portugal. (See map, pp. 328-9.)

661. The situation of the chief seats of Spanish **manufacturing industry** has been determined more by conveniences for commerce than by local supplies of coal or coal and iron. **BARCELONA**,[2] which has long been the chief seaport of Spain, also takes the lead among the manufacturing towns, as Catalonia, the old province to which it belongs, does among manufacturing provinces. Next in importance to Catalonia in this respect are the **Basque provinces**, where the existence of several seaports has long maintained an active commerce. The abundance of iron ore has developed a large iron industry, especially at

[1] Compare p. 322, note 1.
[2] Population, above 500,000.

and near Bilbao. This rapidly growing industry has led to a great increase in the import of British coal, and as most of the ships that take away the ore still come in ballast, it is likely that this will lead to a still further development of the manufacturing industry and the corresponding import trade. The water-power of the Cantabrian Mountains is likewise used in driving modern machinery. The **smelting** and manufacture of **iron** are also largely carried on in the province of **Oviedo** in the neighbourhood of the coal-supplies, and to that province belongs the government factory of artillery, &c., at **La Trubia** (a few miles west of the town of Oviedo). The southern seaports of Seville, Malaga, and Cartagena have all risen into important seats of industry of various kinds.

662. Among locally characteristic industries may be mentioned **esparto-plaiting**, carried on in the provinces which produce this grass, and **silk-spinning** and weaving in **Valencia** and **Murcia**, where the silk-worm is principally reared. **Toledo**, on the Tagus (one of the old capitals of Spain), is still noted for the sword-blades which in former times made the name of the city almost the synonym for a sword. The leather industry, so renowned when the Moorish kingdom of **Cordova** was at the height of its glory, has now declined.

663. All the chief **seaports** are named on the map, pp. 328–9, and from this also may be learned which of them have direct communication with the interior. Those which have the **best natural harbours are Barcelona, Cartagena, Malaga,** and the ports on the **west coast of Galicia.** The harbour of **Barcelona,** protected by the fort of Montjuich, has been made deep enough to admit the largest vessels, and quays for the accommodation of these have been provided (first in 1755) at the suburb of Barceloneta. The harbour of **Tarragona** has been artificially formed at some distance from that of its ancient Roman predecessor. The harbour or roadstead of **Cadiz,** which, together with the position of the town at the entrance to the fertile valley of Andalusia, made this a seaport in the earliest times, is accessible to the largest vessels, though the dock accommodation is defective. The harbour of **Huelva,** though wide and deep enough to accommodate a large fleet of the largest vessels, is obstructed by a shifting bar at the mouth of the Rio Tinto, but this bar can be crossed by specially constructed vessels of as much as 8,000 tons burden. The opposite port of **Palos** is historically interesting as the place of departure of Columbus on the voyage in which he discovered the New World. **SEVILLE** has been made a seaport for large vessels, and is maintained as such only by dredging. **All the ports on the north coast are liable to be obstructed by bars,** due to the accumulation of sand caused by a current which creeps eastwards along the coast. The importance of the port of **Bilbao** has led to the expenditure of large sums of money to remove this defect. The river Nervion, on which Bilbao stands, has been canalised, and the depth of water on the bar increased to an average

of twenty-four feet at spring tides, nineteen at neap tides; but this has been effected only by making the navigation channel extremely narrow and difficult. Improvements at the port of **Pasajes** (east of San Sebastian) have led to the development of a considerable import trade in coal.

663*a*. The chief seaport of Spain in most periods of history has been one having for its hinderland the basin of the Ebro, in that part of the country which contains the most vigorous and energetic part of the population; but, owing to the physical conditions already mentioned at the mouth of that river, it has never lain either on the Ebro or its delta. In Roman times the main outlet and inlet of this hinderland was **Tarragona**, or *Tarraco*, as it was then called, originally a Massilian foundation; but this city was destroyed first by Goths and afterwards by Arabs, and, its harbour having been allowed to be silted up, the port fell into decay. **Barcelona**, another ancient city, with comparatively easy access to the Ebro valley by way of Lerida, then came to the front, and during the middle ages, from about the eleventh century, was one of the chief seaports by the Mediterranean, specially celebrated in the history of commerce for its code of commercial law (*Consulado del mar*) of 1229, and for the Catalan map of 1375. The discovery of the New World gave for a time greater importance to the Spanish ports on the Atlantic, above all, in the end, to **Seville**, which in 1501 was made the sole seaport for transatlantic trade. Twelve galleons proceeded thence annually to Portobello, on the isthmus of Panama, and after 1547, fifteen to Vera Cruz to bring back thence the treasures of the New World. The Crown of Spain claimed for itself one-fifth of the precious metals produced by the mines of the 'New Indies,' and these royal treasures were stored in Seville in the Torre del Oro, or 'tower of the gold.' The export from Spain even of the gold and silver belonging to private merchants was forbidden, a policy which is recognised by economists from the seventeenth to the twentieth century as having been the ruin of Spanish industry. Causing prices to rise higher in Spain than elsewhere, it rendered the people of Spain unable to manufacture so cheaply as the inhabitants of other countries, who sold their products in Spain and obtained by stealth the gold and silver which could not be exported openly.

664. The chief Portuguese seaports on the west coast are **OPORTO**, **LISBON**,[1] and **Setubal**; on the south coast, **Faro** and **Olhão**. A new harbour for Oporto, admitting vessels of 5,000 tons, has been constructed at **Leixoes**, three miles north of the mouth of the Douro, in order to avoid the bar at the mouth of the river already referred to; and on the land side the communications of Oporto have lately been improved by the construction of a railway to Salamanca, which reduces the distance by rail to Paris to 1,031 miles or 283 miles less than from

[1] Population, 200,000.

Lisbon to Paris. The estuary of the Tagus forms an admirable natural harbour for Madrid (410 miles distant by rail), and vessels of the largest size can now load and discharge at the town quays.[1]

665. MADRID[2] owes its importance solely to its being the political capital of Spain and to its central position. **VALLADOLID** is the chief centre of trade for the northern half of the Spanish tableland (Leon and Castile).

665*a*. Gibraltar, a fortress on a commanding rock at the east of the strait of that name (at this place nearly 18 miles, at its narrowest about 8 miles wide), has been in the hands of the British since 1704. The Spaniards complain of the smuggling alleged to be carried on across the British frontier, but this evil is now greatly reduced. Commercially Gibraltar is important as a coaling-station, but at present large steamers have to coal in the roadstead, and the coal is stored in large floating pontoons. Large works are now (1908) in progress, however, for the provision of a commercial as well as a naval harbour, and when these are completed there will be 30 to 35 feet of water in the enclosed area at low-water ordinary spring tides, and large steamers will be able to coal and load and discharge cargo alongside of the quays. Large cold stores have already been erected.

[1] As to the former commercial importance of Lisbon, see 567*a*.
[2] Population, 500,000.

ITALY

666. The **area** of **Italy** is about one-twelfth less than that of the United Kingdom, but the population nearly one-fifth smaller. The **density of** the **population** is thus less on the whole, but, as the map shows, the density is nearly everywhere high.

Enclosed on the north and north-west by the Alps, and washed almost everywhere else by the sea, the country has well-defined natural boundaries. The hindrance to communication presented by the Alps and the nature of the communications now established across and through this barrier have already been considered (575). Many passes across the **Apennines**, which are continuous with the Alps in the north-west, and stretch through the entire peninsula, have facilitated the construction of railways, and, as is shown on the map, pp. 276–7, there are now several lines completed or in progress connecting the principal railways on opposite sides of the peninsula. These last, it will be seen, keep for the most part close to the coast-line, that on the east being continued along the south coast to Reggio, on the Strait of Messina. **On the eastern side the railway**, running northwards, **forks at Rimini, and one main line** proceeds north-westwards, with remarkable directness till it **crosses the Po at** the old bridge-town of **Piacenza**; **passing through** a number of old towns of more or less note, **Forli, Faenza, Imola, Bologna, Modena, Reggio**, each lying at the outlet of a valley of the Apennines (114). This railway-line marks pretty well the boundary between the foot-hills of these mountains and the great plain which stretches between them and the Alps. **The other main line** still keeps near the coast as far as **Ravenna**, and then sweeps round the low and marshy region extending from the delta of the Po to the mouth of the Reno, **crosses the Po near Ferrara**, and passes through Padua to Venice. The marshy region just referred to includes the lagoons called the **Valli di Commachio**, which are of importance for their production of **bay-salt** and their **eel-culture**.

667. The **navigable rivers** of Italy are nearly all confined to the great northern plain. The **Po is navigable** for boats to Turin, **for steamers to Valenza**, seven miles below the confluence of the Sesia; the **Ticino** is navigable from its issue from Lake Maggiore; the **Adda** from its issue from Lake Como, the **Adige** from a little below Bozen in Tirol (Austria), the **Bacchiglione** from Vicenza, the **Brenta** from

Padua. In the peninsular portion of the country the only navigable rivers are the Arno and the Tiber, the former being navigable by boats to Florence, the latter by steamers to Rome, and by smaller boats sixty miles higher up.

668. The climate of Italy has the characteristics of that of the Mediterranean in general, but if we make a comparison with Spain and Portugal, it is important to observe that Italy lies further north than the Iberian Peninsula, that the Italian Peninsula is narrower, and that the surface is more irregularly mountainous. Whereas nearly half of the Iberian Peninsula lies to the south of 40° N., in Italy the only parts to the south of that line are the southern half of the Island of Sardinia, the whole of Sicily, and portions of the smaller peninsulas of the mainland. These southern portions of Italy have a climate like that of southern Spain (657), and in particular are distinguished by the same degree of drought in the summer months. The greater part of Italy, however, is blessed with a much greater rainfall than Spain, for whereas in Spain the edges of the tableland serve to cut off rain to a large extent from the interior, the mountains of Italy promote the rainfall, especially since they descend to the sea on both sides. Even the plain on the north of the Apennines is not deprived of rain through the intervention of these mountains, since the rain-bearing winds are forced to ascend still higher by the loftier ranges of the Alps. The glaciers of these mountains likewise help to maintain the volume of the innumerable streams which descend from them, and thus increase the supply of water for irrigation, which has been carried out on a more extensive scale in Italy than anywhere else in Europe. The irrigated area in the Po basin is about equal in size to the counties of Lincoln and Norfolk combined. The largest of the Italian irrigation canals is the Cavour Canal in Piedmont.

668*a*. Extensive tracts of the lowlands of Italy suffer greatly from malaria, the Tuscan Maremme, the Roman Campagna, the Pontine Marshes in southern Latium, the shores on the west side of the Gulf of Taranto, and the Sardinian plains being the most severely stricken areas. Considerable ameliorations have, however, been carried out by means of drainage and other works, and the discovery of the connection between mosquitoes and the propagation of malarial fever has led to further steps being taken for the preservation of health in the infected districts. The Maremme, the Pontine Marshes, and the Roman Campagna have all benefited by such operations, the part of the Campagna lying to the north of Rome having been completely transformed. The plains round Verona have also been reclaimed, and by means of a huge pipe under the Panaro (completed in 1899) the whole area between the embankments of the Po, the Secchia, and the Panaro (including the marshes below Ferrara) is now drained into the Adriatic.

669. Altogether, the climate and soil of Italy are sufficiently good to allow of the existence of a large population directly dependent upon

agriculture. The **area** occupied by **corn-crops** is about **twice as great as in the United Kingdom,** over and above the area under **vineyards, olive-yards, fruit-trees, sugar-beet** (increasingly cultivated since 1890), **flax** (cultivated almost solely for the seed), **and hemp** (especially in the provinces of Ferrara and Bologna), pasture-grasses, &c. The principal corn-crop is **wheat.** It covers from four to five times as great an area as in the United Kingdom, but the only Italian wheat that is noted for its quality is that of **Apulia,** in the south-east, where there is grown a **hard wheat** well adapted for making **maccaroni. Maize,** the second Italian corn-crop in extent of acreage, furnishes the chief food of the people throughout a large part of the country (159). As the maize that falls to the lot of the poorer classes is often mildewed, the use of this standing dish is blamed as the cause of a disgusting disease known as **pellagra,** very prevalent among the Italians. In northern Italy very great advances in agriculture have been made in recent years by the introduction of the rotation of crops and of chemical manures, and by the spread of agricultural education.[1]

670. The Italian production of **raw silk** (reputed the best in the world), **rice, wine, olives, oranges,** and **figs** is referred to elsewhere; and here it may be added that **rice** is the most valuable crop of the **irrigated fields in the north,** and that the production of wine is extending most rapidly in the southern parts of the country, above all, Sicily. Most Italian **wines** are ill-prepared, so that they deteriorate instead of improving with age. Among those in best repute are Marsala, grown in the west of Sicily; Chianti, grown in the higher parts of Tuscany to the south of Florence; and Asti, grown on the southern slopes of the Piedmontese hills to the west of Alessandria. The **grass and forage crops of** Italy are of special importance **in the irrigated plains.** The meadows are regularly mown four times a year, and in some peculiarly favoured districts as many as **nine crops have been known** to be reaped **in a single year** from the same field. The richness of these meadows leads to a large trade both export and import, calves being largely imported from the Tirol and Switzerland and returned or exported to France as fat cattle. But besides this export of cattle there is a large **import of milk-cattle from Switzerland,** these imported animals yielding a larger quantity of milk than the native breeds. When fed on irrigated meadows for ten months in the year Swiss cows produce 700 gallons of milk, as against about 550 gallons produced by the native cows. This large produce of milk gives rise also to a large trade in **cheese.** The famous **Parmesan, Gorgonzola,** and **Stracchino** cheese are all made in the plains of Lombardy, the first-mentioned, therefore, not, as its name would indicate, in the province of Parma.[2] The rearing of **poultry** is likewise characteristic

[1] See *Econ. Journ.* vol. XII. (1902), p. 83 (in a review of F. S. Nitti, *L'Italia all' alba del Secolo XXmo*).

[2] In territories, however, that once belonged to the duchy of Parma.

of the agriculture of northern Italy, and to this cause we owe not only the large export of eggs, but also fowls, for poultry form the next item in value to cattle under the head of animals exported. Italian eggs now even reach England. Apulia, besides being noted for its wheat, is noted for its wool. The sheep of this province are migratory like those of the Spanish tableland, wide tracts being reserved for their migrations along the regular routes.

671. Minerals. The **Sicilian sulphur** (423·10), produced chiefly in the neighbourhood of Caltanissetta, Girgenti, and Catania, is the most important mineral product of the kingdom. **Iron ore** of excellent quality is obtained in the Island of **Elba** (393), and is exported chiefly to the United Kingdom. Ores of the same metal are worked in the **Val Trompia**, in Lombardy (between the lakes Iseo and Garda), and in the Island of **Sardinia**. **Lead** and **zinc** are important products of this island (the south-west round Iglesias). Tuscany produces among the Apuan Hills in the north the celebrated **statuary marble** of Massa and Carrara, and in a volcanic district in the south large quantities of **boracic** acid escape from the ground in the form of vapour, and the acid is concentrated in water and then solidified. Mineral fuel exists chiefly in the form of **petroleum**, of which there are wells in the Emilian Apennines (chiefly in the province of Piacenza), and **lignite** (373), the chief centres of production of which are Castelnuovo (prov. Arezzo) and Spoleto (Umbria).

672. Italian **manufactures** have developed in recent years with remarkable rapidity, even those dependent on power-driven machinery in spite of the dearness of coal.[1] The chief local advantages to set against this disadvantage are the density of population furnishing abundance of labour and a large local market, the abundance of water-power, and in some cases, more particularly in that of the chief textile industry (silk), the abundance of the raw material. Italian labour is not only abundant, but it is excessively cheap, for certain kinds of work apparently the cheapest in Europe in proportion to efficiency.[2] The

[1] Coal is imported chiefly from England, and there is accordingly a good deal of significance in the following comparison of the average pit-mouth prices of coal per ton in the United Kingdom and import prices in Italy (at 25 lire to the £). The year 1896 was the year of minimum, 1900 that of maximum, prices in the United Kingdom in the period 1889–1901. In spite of the high price in 1900, the quantity of coal imported in that year (nearly 5,000,000 tons) was greater than ever before.

	1896		1899		1900	
	s.	*d.*	*s.*	*d.*	*s.*	*d.*
United Kingdom . . .	5	10¼	7	7	10	9¾
Italy	16	9½	24	9½	33	6

[2] It is the cheapness of Italian labour and the unsatisfactory conditions at home of which that cheapness is the sign, that lead to such a large annual temporary as well as permanent emigration (considerably more than 100,000 under each head). See the note on p. 38. The temporary emigration is to a large extent of labourers in bodies under contract (73), but the emigration law of 1901, which suppresses emigration agents, is apparently designed to put a stop to this.

water-power ultimately capable of being utilised in Italy is estimated at upwards of 3,000,000 horse-power, and with the aid of electricity this is being steadily made more available.[1] Manufactures are, however, also artificially stimulated by protective duties under the tariff of 1887, modified to some extent, for those countries which enjoy the benefit of most favoured nation treatment, under the commercial agreement with France of 1899.

672*a*. The manufacture of **silk** yarn by the operations of throwing and twisting is the chief Italian manufacturing industry connected with **silk** (**231**), an industry making use not merely of the valuable raw material produced at home, but also of large supplies from abroad. The weaving of silk by power-looms is now, however, rapidly developing, chiefly at the expense of the French industry.[2] The principal centre of this industry is **Como**, where there is a flourishing school in connection with it. Cotton manufactures have grown with equal rapidity, and are likewise now taking a high place among the exports. The spinning branch of the industry is producing yarns of increasing fineness (comp. Introduction to the Fourth Edition, par. 18). Woollen manufactures are of considerable importance for home consumption. If one place may be singled out from others in which the **woollen industry** is concentrated, it is the small town of **Biella**, in an Alpine valley in Piedmont, where the industry, having first been fostered by the abundance of the raw material, had attained a position of importance by the middle of the fourteenth century (comp. Verviers, **658*a***). Cotton, linen, iron, earthenware, and leather manufactures have since grown up at the same place. Schio and Pordenone, near the base of the Alps in Venetia, are among the places at which textile factories have been established in the east, and the former has the advantage not only of water-power, but of a supply of lignite in the vicinity (at Valdagno).

673. The **iron industry** has been specially encouraged in recent years by the Italian government with the view of making itself independent of foreign countries. Till lately the only important blast furnaces in Italy were those of Follonica, Cecina, and Piombino for smelting the ores of Elba, but in 1899 a company was formed to start large blast furnaces on Elba itself (at Portoferraio). Besides these there are a few small charcoal furnaces at the base of the Alps in the provinces of Bergamo and Brescia. A speciality of the Italian iron industry is the refusion of old iron, which is imported for the purpose from all parts of the world. This industry is carried on chiefly on the

[1] In 1900 about 300,000 horse-power was estimated as being already effectively utilised. The application of Italian water-power is still proceeding rapidly. In the beginning of 1908 it was stated that all the best hydraulic powers of the Alps of Lombardy had already been utilised. At Piano d'Orta, on the Pescara, the power derived from that river is utilised in the manufacture of carbide of calcium in the first works erected for the production of nitrolim. (See p. 321 *n.*)

[2] In the last ten years of the nineteenth century the value of the Italian exports of manufactures of pure silk increased more than three-fold, while that of the imports (now less than one-fourth of that of the exports) considerably diminished.

Ligurian coast not far from Genoa. Large steel works have been established at **Terni**, where advantage is taken of the enormous **water-power** furnished by the falls on the Nera, a left-bank tributary of the Tiber, and where there is the further advantage of a supply of **lignite** at **Spoleto**, a few miles distant. Other important steel-works are carried on at Milan and Savona. A considerable amount of iron and steel **ship-building** is carried on not only in the government arsenals at Spezia, Venice, Castellammare and Taranto, but also by private (including some foreign, English, and other) firms under a system of bounties begun in 1885. Cannon are made not merely in the royal arsenals, but also in the private works of Armstrong at Pozzuoli.

674. The characteristic manufacturing **industries** of Italy, however, are mainly those **of an artistic or semi-artistic nature.** The **glass-works and** the **lace** industry of **Murano,** an island town to the north of Venice, have long been noted, though these industries have both declined. **Florence** produces fine **earthenware and mosaics**; Naples, Florence, and other towns are noted for their works in **coral (359) and shell** (cameos), and many Italian towns for their **sculptures** in marble and alabaster and their **artistic woodwork**. Milan is the chief seat of Italian cutlery. Tuscany is well known for its **straw-plaiting (466*a*)**. The growth of Italian leather industries is leading to an increasing import of hides from India.

675. The leading features of Italian **commerce** are exhibited in the tables on pp. 580, 581, 607, but it may be noted as one of the striking peculiarities of the foreign commerce of this country that the **chief articles of export are sent abroad by land**, notwithstanding that the country has such a large extent of seaboard and many good ports. The reason of this is obvious. The products of the northern provinces, silk, wine, oil, eggs, &c., are more cheaply sent to their principal destinations by an all-rail route than by one which involves a transhipment at two seaports, and in some cases a longer railway journey over and above.[1] The circumstance here referred to is prejudicial to some extent to Italian shipping, inasmuch as it causes the imports at the principal seaports of the mainland greatly to exceed the exports, and hence makes it difficult for vessels both o land and ship a cargo at the same port.

676. Besides Rome, the capital, the chief inland towns are Milan, Turin, and Florence. **ROME**[2] owes its pre-eminence more perhaps to historical than to geographical circumstances; but its situation is not without geographical advantages, some of which must have been of more importance in early times. It lies about midway between the extremes of the kingdom, on the chief river of the peninsula (667). Its chief port is Civitavecchia (677). **MILAN,**[3] the former capital

[1] Of the imports from Italy into the U.K. in 1908 only 55% came direct, nearly 25% through France, and more than 20% through Belgium. All the silk manufactures and thrown silk, and all the eggs, our leading imports from Italy, came in 1908 by land routes.

[2] Population, 460,000. [3] Population, 500,000.

of Lombardy, has become a great seat of trade, chiefly in consequence of its central position in one of the most fertile parts of the northern plain. The Alpine passes approached by the roads along the banks of Lakes Maggiore and Como confer additional importance on it, and this importance has been further enhanced by the St. Gothard railway. It is the centre of the trade in silk, a great seat of silk and other industries, and is noted for its cutlery. **TURIN** [1] (Ital. *Torino*), the former capital of the kingdom of Sardinia, for a short time of the kingdom of Italy, is situated on the Po, where it passes round the base of a bastion of the Apennines, and just in face of the valley of the Dora Riparia, which leads up to two of the most frequented Alpine passes of the middle ages, the Monte Genevra and Mont Cenis passes. It is the valley now traversed by the Mont Cenis railway on the eastern side of the Alps. **FLORENCE** [2] (Ital. *Firenze*), the former capital of Tuscany, lies at the head of the most considerable and fertile plain of that province, closely begirt by hills. **BOLOGNA**: see **666**.

676*a*. **Susa** stands at the fork of the passes leading from the upper part of the valley of the Dora Riparia west of Turin, the Monte Genevra pass leading thence south-westwards to the mouth of the Rhone valley, the Mont Cenis north-west up the Rhone valley. In the middle ages two other passes were of importance in relation to Turin, those, namely, branching off at **Aosta** at the upper end of the valley of the Dora Baltea, the Little St. Bernard leading westwards to the Isère and thus to the Rhone valley, the Great St. Bernard to the Rhone valley in the Swiss Canton of Valais above the Lake of Geneva. **Florence** occupies a position of peculiar importance as a meeting-place of trade-routes. The greater part of northern Italy, including all that part on which the Alpine passes from the Simplon to the Brenner descend, communicates most easily with all southern Italy by the route passing through Bologna and Florence. In the middle ages this route led due south across La Futa pass (under 3,000 feet). Now the railway passes up the valley of the Reno, then south by way of Pistoja, and on that railway trains are to be seen containing trucks that have passed through both the St. Gothard and the Brenner tunnels. Moreover, from its situation at the head of the fertile plain of the Arno it brings all that plain into connection with places beyond the mountains in different directions. The commercial advantages arising from this situation at an early date developed manufactures, for which the sheep pastures of the Maremma (on the coast of Tuscany) supplied raw material. The wealth thus created led to the development of banking, which had risen to considerable importance in the city as far back as the thirteenth century.

677. In order of rank the principal Italian seaports now, as they were in the middle ages, are **Venice** and **Genoa**, but as regards the

[1] Population, 350,000. [2] Population, 200,000.

value of their commerce they are both only shadows of their former selves. Of the two, Venice is first in the value of its exports, but Genoa in the value of its imports, which is three or four times that of its exports. **VENICE** (Ital. *Venezia*), the chief port, not only for the eastern part of the northern plain, but also for the traffic of the Brenner railway, stands, as is well known, on numerous islets in a lagoon guarded by a line of low sand islands. Through this barrier there are two channels, the **Lido** in the north and the Malamocco in the south, which have been made deep enough for the largest vessels. Venice is one of the few places belonging to the Mediterranean basin at which there is a sensible tide; and since the construction of long piers at the **Malamocco Channel** the scouring action of the tide has been so much increased that the channel has been deepened from about 16 to about 30 feet, and the adjoining part of the lagoon has likewise steadily increased in depth. **Chioggia** is the port at the south end of the lagoon to which Venice belongs. **Brindisi** is not of much consequence as a commercial port, but it is well known through the world as the place for taking up and landing passengers and mails on the land route to and from the Isthmus of Suez and the East. **GENOA**[1] (Ital. *Genova*[2]) has a fine natural harbour, but the growing commerce has necessitated improvements and enlargements. A commercial port with a depth of 26 to 40 feet has also been established on another Ligurian inlet, the Gulf of **Spezia**, the chief Italian naval station, but this port has the disadvantage of difficult communication with the interior. For centuries **LEGHORN** (Ital. *Livornò*[3]) has been the chief seaport of the valley of the Arno and the whole of Tuscany. **NAPLES**[4] (Ital. *Napoli*), the most populous town in Italy, has a deep and spacious harbour enclosed by moles. At this port also the imports, consisting mainly of cereals and a variety of manufactured articles, are of three or four times the value of the exports, among which the chief are animals and animal products, hemp and flax. **Fiumicino**, founded in 1825, a little to the north of the mouth of the Tiber, is one of the ports of Rome, but does not rival the older but more distant port of Civitavecchia ('Old Town'). The port of **Civitavecchia** is an artificial creation, and the harbour is still in need of improvement. Vessels of 18 to 22 feet have to be moored at the breakwater and lighter till their draught is reduced to 18 feet.[5] **PALERMO**,[6] the chief Sicilian port, has not so good a harbour as its ancient predecessor *Panormus*, the modern town, in consequence of a rise of the coast, covering part of the site of the ancient harbour. Dredging and blasting are now being carried on to deepen the present harbour. Most of the Sicilian ports export large

[1] Population, 240,000.
[2] Pronounced, however, *Jen'oa*.
[3] Pronounced *Li-vor-naw'*.
[4] Population, 560,000.
[5] The creation of a great port at Ostia, the ancient harbour of Rome, is projected.
[6] Population, 300,000.

quantities of oranges and other fruit. Palermo is also the chief place of export of Sicilian sumach and manna. **MESSINA** exports large quantities of wine-lees; **Marsala** is the chief place of export of wine; **Girgenti, Licata,** and **CATANIA** are the chief ports for sulphur. For the names of other seaports see the map, pp. 276-7.

677*a*. The high value of the commerce of **Venice** and **Genoa** in the past was in a large measure due to the enormous profits earned by those who were successful in the trade in the relatively high-priced commodities derived from the East, above all pepper and spices (**697**). Venice and Genoa were so situated as to serve as the principal intermediaries in that commerce for a larger proportion of the population of the plains of northern Italy than any other ports. For Venice, the immediate hinderland was (and is) the eastern part of those plains; for Genoa it was (and is) the western part of those plains. Both, however, had an important extension of those hinderlands beyond the Alps. In the case of Venice the trans-Alpine markets were mainly reached either by the Brenner or the Reschenscheideck (**609*a***). The Brenner route, including the section below Innsbruck emerging on the high plain of Bavaria to the north of Ratisbon, gave the most direct access to southern Germany and all the territories reached by the rivers of the Elbe basin, and thus brought the Baltic generally into communication with the east by way of Lübeck (**595*a***). Both the Brenner and the Reschenscheideck brought Venice into connection with the Rhine valley, and so with the ports on the North Sea, but in both cases a second pass had to be crossed before Augsburg was reached (**609*a***). In the case of Genoa the trans-Alpine markets were reached mainly by the pass-routes converging on Milan (**603**), and above all by those (of which there are several) ascending the Rhine valley above the Lake of Constance to Coire, then diverging and meeting again to pass down the east side of Lake Como and across the old bridge at Lecco. All these routes brought Milan into connection both with the Rhine and Elbe basins through Ulm, with that of the Elbe also through Augsburg. In the later middle ages the more direct north route across the St. Gothard was also frequented, and for the north-west the Simplon route was also important. Other trans-Alpine markets were reached by way of the passes converging on **Turin** (**676**), but for these markets Genoa had a rival both in **Savona** and the ports at the mouth of the Rhone valley (Marseilles and Narbonne). From the early part of the fourteenth century a large part of the trade of Venice and Genoa with the Low Countries was carried on by sea—by the so-called 'Flanders galleys.'

677*b*. **Venice** owed its origin and early rise solely to the fact that during the first period of its history an easily defended situation was a matter of the first consequence. The islands in the lagoon in which it stands were settled in 452 by refugees from the port of Aquileia at the time of its destruction by the Huns. Aquileia, now an inland

village in Austrian territory close to the Italian frontier, with a harbour long ago silted up, then had much the same importance as a port of the Roman empire that Venice had in later times as an independent republic. The refugees of 452 were reinforced by others fleeing before the Lombard invaders of 568. The islands on which the city now stands were settled in 810, and shortly after that date Venetian ships were known in the eastern waters of the Mediterranean. Its commerce increased rapidly after the Venetians (about 990) conquered the coasts of Istria and Dalmatia and put down the pirates by whom those coasts were infested. In later times Venice had numerous factories in the Levant and territorial possessions were acquired there both by the state and Venetian families. The trade both of this city and of Genoa was greatly extended by the crusades. The fourth crusade, in particular, which was diverted by the Venetians from its main purpose and resulted in the capture of Constantinople in 1204, was the principal cause of the acquisition of territory both by Venice and Venetians. Crete was in the possession of Venice from 1206 to 1669. Not till 1338 was any territory acquired by Venice on the mainland of Italy. For a long time **Chioggia** was a rival of Venice, and no doubt the greater security of the situation of Venice greatly contributed to its final triumph. At all times the mudbanks of the lagoon have been a hindrance to communication with its hinderland, but in former times this was a minor consideration, especially since the streams entering that lagoon, the Brenta and Bacchiglione, afforded an entrance to that hinderland for small boats. In modern times this hindrance is overcome by the long railway bridge connecting Venice with Mestre, but now the growth of the port is greatly cramped by the smallness of the site afforded by the Venetian islands. The population already existing there is accommodated only by building to a great height the houses that border the canals and the narrow foot-paths.

677*c*. **Genoa** dates from Roman times, but has always suffered from the fact that the Apennines have hindered its communication with the most populous and productive part of its hinderland. On the other hand, this drawback is counterbalanced by the fact that there is no rival that does not suffer from a similar disadvantage, as well as by the fact that the Apennines are here at their narrowest and not very high, and that the roads across or through them lead directly to the most populous part of the north Italian plains with Milan for their centre. The pass formerly used in crossing the Apennines, the Bocchetta, is under 3,000 feet in height. Now two railways (both, however, with heavy gradients) connect Genoa with the plains through mountain tunnels. The commerce of Genoa began to be really flourishing in the eleventh century. The rivalry between it and Venice led to prolonged and repeated hostilities between the two. They inflicted on each other severe losses and injuries, but the commerce of both continued to flourish as long as the geographical conditions to which that commerce

was due continued. **Savona**, the neighbouring rival of Genoa, had in past times the advantage of a lower pass across the mountains behind, namely the Col dell' Altare, which is taken as marking the limit between the Alps and Apennines, and has a height of only 1,600 feet; but this advantage, even joined with that of a shorter route to Turin (now nine miles shorter by rail than that from Genoa), has never served to outweigh the fact that the district thus connected with Savona is much smaller, less populous, and less productive than the hinderland of Genoa.

677*d*. Pisa, the seat of a powerful republic from the eleventh till near the end of the thirteenth century, from 1405 a Florentine port, was the chief outlet of the valley of the Arno, till it was replaced by **Leghorn**. Even at the time of the acquisition of Pisa by Florence its port had been nearly silted up, and in 1421 Florence purchased Leghorn from Genoa, and by repeated improvements its artificial harbour has been adapted to modern requirements, while Pisa has long been an inland town, important only on account of its memorials of the past.

677*e*. The populousness of **Naples** answers to the extraordinary productiveness and proportionate density of population of the adjoining plain now mainly comprised in the provinces of Naples and Caserta. For its size this small plain is probably without a parallel in Europe in fertility, and it has had a high degree of importance from this cause from very early times. It was no doubt this fact that caused the Greeks to found on the coast of this plain one of the oldest of their Italian colonies, that of *Kyme*, the Latin *Cumæ*, the mother-city of Naples.[1] In the most troubled period of the middle ages, the chief seaports in this part of Italy were the Lombard city of **Salerno** and the independent city of **Amalfi**[2] on the south side of the rocky peninsula to the south of the Bay of Naples. From the sixth to the early part of the twelfth century Amalfi was particularly important, and there can hardly be a doubt that its commercial importance was largely due to its relations with this plain to the north, whether those relations were maintained by land (as they could be only with difficulty) or by sea. The fact that its situation made it quite secure against attack on the land side must have formed at that time an important advantage. From the later middle ages down to the present time Naples has, however, always been the one great port for this plain, and down to 1860 its populousness was enhanced through its being the capital of a kingdom.

678. Malta and **Gozo** are two densely peopled British islands to the south of Sicily. **Valetta**, on Malta, is an important fortress and coaling station. The prevailing language is a debased Arabic, that of the upper classes Italian, though English is spreading. Early potatoes are the chief commercial product.

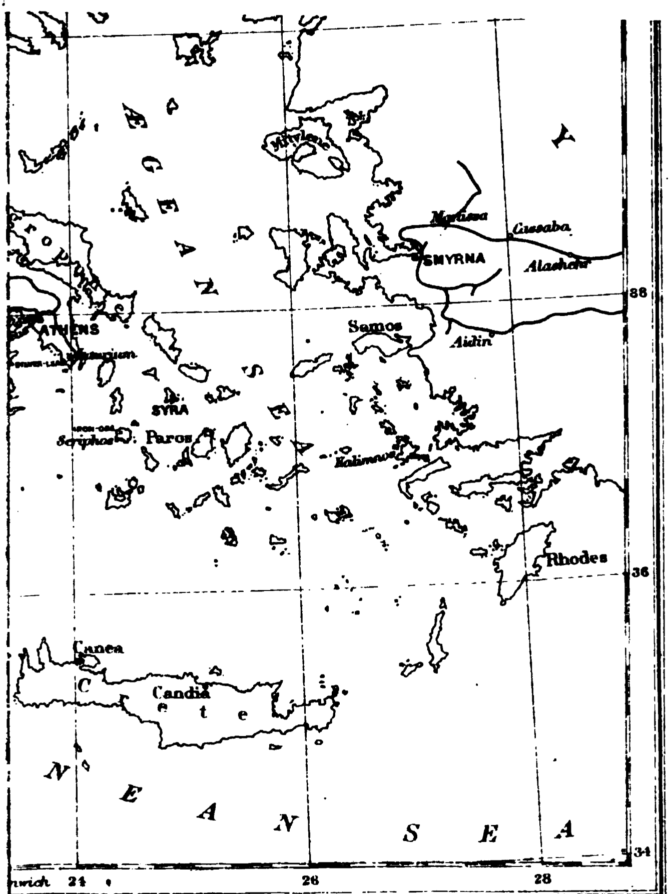
[1] Greek, Neapolis—'New City.'
[2] Amalfi, like Venice, owned a nominal allegiance to the Byzantine Empire.

THE BALKAN PENINSULA

679. Under this name we include the **greater part** of the region lying to the south of the Danube and Save. Together with the adjacent islands belonging to Greece and to European Turkey (and among these Crete), the total **area**, exclusive of the Austrian province of Dalmatia, is about one-fourth larger than that of the United Kingdom. Comprised in this area are **European Turkey**, the kingdoms of **Greece** and **Servia**, the tsardom of **Bulgaria**, with **Eastern Roumelia**, the kingdom of **Montenegro**, and the Austrian provinces of **Bosnia** and **Herzegovina**.

680. The **population**, except near the chief towns and on some of the islands, is scanty. The **surface**, including that of the islands, is highly **mountainous**, the most considerable extent of lowlands being those which border the Danube in the north of Bulgaria. The **Save** and the **Danube** form an important line of communication on the north—how important, may be gathered from what has already been said elsewhere (612), as well as from the fact that a sea-going steamer has accomplished the voyage to a port in the east of Servia. The **other rivers** of the peninsula are **of little importance for navigation**, and the irregularity of the surface throws great obstacles in the way of inland communication by roads and railways. **Two great routes are marked out by nature** as lines of communication between the Danube near **Belgrade** and ports on the south coast. One of these ascends the **valley of the Morava** to the frontier of Servia, crosses a low-water parting (1,750 feet) between that valley and the valley of the **Vardar**, and descends the latter to the port of **Salonica**. The other branches off from this route eastwards at Nish in Servia, ascends the **valley of the Nishava**, and crossing a water-parting 2,400 feet in height, ultimately gains the valley of the **Maritsa**, in which are the most extensive lowlands of the peninsula away from the Danube. In the lower part of this valley the route divides. One branch continues south-eastwards to **Constantinople**, and the other keeps to the valley of the Maritsa, and touches the Ægean Sea at the port of **Dede Agach**, a little to the west of the mouth of that river. **Railways** have now been laid along all these routes. The last section on the line between Belgrade and Constantinople was opened in August 1888.

681. In view of the difficulties of the ground and the paucity of



New York. Bombay & Calcutta.

the population, it seems likely that these railways will long remain the only through lines between the north and south of the peninsula. The railway up the valley of the Vardar has, indeed, been continued north-westwards across the **Shar Dagh** as far as the Ibar River in Novi-bazar, but beyond that the difficulties are in the meantime too great to hold out the prospect of a speedy connection with the railway that has already been constructed **up the valley of the Bosna to Sarajevo.** A **carriage-road** made by the Russians has since 1879 crossed **the Balkans at the Shipka Pass** (4,000 feet), but the descent from this pass on the southern side is rather abrupt for a railway. The route on which it occurs is, however, in other respects highly advantageous, connecting as it does the towns on the Lower Danube (Nikopoli, Sistova, Rustchuk) with the valley of the Maritsa, and passing through some of the most productive parts of the peninsula.[1]

682. A **ship-canal** 26 feet in depth has been pierced through the **Isthmus of Corinth**, not merely for the purpose of effecting a saving in time (about half a day) in the voyage between the east and west of Greece, but also to enable ships to avoid the often dangerous voyage through the rocky waters in the neighbourhood of the Island of Cerigo, but the traffic of the canal (opened in 1893) has not answered expectations. Foreign steamers avoid it on account of its narrowness (100 feet) and the strength with which the current sometimes flows through it.

There is likewise a **project for deepening** the now **shallow strait between the island of Santa Maura and the mainland**, so as to make it passable by ships, and thus save four hours on the voyage between Corfu and Patras.

683. Of inland works of engineering the **draining of Lake Topolias** or Kopais, completed in 1893, is of high importance. It adds nearly 100 square miles of excellent soil capable of irrigation to the cultivable land of Greece, and at the same time effects a great improvement on the salubrity of the district. Similar land adjoining now yields from 1,600 to 1,800 lbs. of cotton per acre (comp. **248, 249**).

684. Notwithstanding the peninsular character of this region, and its southerly latitude, the **climate**, in accordance with the easterly position, is one of **great extremes.** In summer the temperature is as warm as in Italy, but in winter by far the greater part of the peninsula has more than a month of mean daily temperatures below the freezing-point. The districts in which such temperatures prevail longest are naturally those northern plains and high valleys which are more or less directly exposed to the cold winds from Russia.

685. The **principal commercial products** of the peninsula are **nearly all agricultural.** In agriculture generally the greatest advance

[1] Hence, as will be seen from the accompanying map, a railway is now projected to connect Tirnova by this route with the line that already runs northwards from the Maritsa valley to Kezanlyk, at the foot of the Shipka Pass.

has probably been made in recent years in Bosnia, since it came under Austrian administration. The area under cultivation has been greatly extended, and its productiveness increased. **Cereals** form the chief article of export from Bosnia, Bulgaria and Eastern Roumelia, and Turkey; animals, and above all **pigs**, fed on the mast of beech-forests, from Servia; **currants** (see table p. 608) from Greece. Of the cereals, maize predominates in Bosnia and Servia, wheat in the rest of the peninsula. Among special agricultural pursuits the most noteworthy is that of the cultivation of roses, for the sake of producing the valuable perfume known as **attar of roses**. This industry has long had its chief seat at **Kezanlyk**, which lies on the Upper Tunja, near the foot of the Shipka Pass, in a high valley sheltered by the Balkans on the north, and by a minor range on the south. Recently attempts have been made to start the same industry among the Rhodope Mountains, in the south of Eastern Roumelia. Orchards, in which **plum-trees** predominate, abound in Bosnia and Servia, and furnish a leading article of export from both. Wool is an important product in Turkey. **Wine, tobacco,** and **silk** are produced more or less everywhere, and the export of Bosnian and Servian wine (chiefly for mixing with other wines), though as yet small, is steadily increasing. The cultivation of **currants** and **figs** in Greece is referred to elsewhere (**176***c*, *d*), but here it may be mentioned that the large export of currants which formerly took place to France was due chiefly to the use of this fruit in wine-making.[1] The **honey of Hymettus** (to the east of Athens), so celebrated in ancient times, is still an important article of commerce.

686. Like most mountainous countries, the Balkan Peninsula is rich in **minerals**; but owing to the defectiveness of the communications, as well as the sparseness of the population, the mineral resources are as yet very **inadequately developed**; **Greece**, in which valuable minerals are found close beside the sea, is the only country belonging to the peninsula in which the mineral products take a leading place among the exports, and even in that country the working of the mineral deposits has been recommenced only in recent years. The chief minerals of the country are the **silver-lead** and **manganiferous iron ore of Laurion** (at the south-eastern extremity of Attica) and the **iron ores** of the island of **Seriphos**. Among the minor minerals of the country is the celebrated statuary marble of the Island of Paros.

Silver-lead, iron, copper, and coal mines are all worked with success in **Servia**. Of the **coal-mines** some are situated eight miles from Chupria, the head of steam navigation on the Morava, others near the

[1] This export began in 1877, when the total was 881 tons. It rose to a maximum in 1889 when it reached 70,000 tons. The revival of the French vineyards from the devastations of the phylloxera then led to a demand in France for protection against Greek currants, and by successive steps the import duty was raised from 6 francs to 25 francs (November 1894) per 100 kilos. For this export accordingly Greece has been thrown back on her former markets of England and Holland, with the result that a serious crisis has come about in the currant trade.

eastern frontier (see map, pp. 346–7). In **Bosnia** the chief mines are those of brown coal, iron, manganese, chrome, and copper. In **Turkey** are the copper mines of the Rhodope Mountains, the marbles of the islands which give the name to the Sea of Marmora, and those of Mount Athos, the manganese mines of Kassandra in the vilayet of Salonica; and salt is produced on the bays of the Adriatic and the Ægean.

687. The **manufactures** throughout the peninsula are almost entirely of merely local importance. The making of **carpets** in Turkey (at Salonica and elsewhere) is the only branch of manufacturing industry that furnishes an export of any consequence. To stimulate the growth of certain manufactures, the Turkish government has resorted to the plan of offering to establish monopolies for a term of years under certain conditions.

688. The chief countries with which the foreign commerce of the different parts of the peninsula **is carried on** are the United Kingdom, Austria-Hungary, Russia, and France. In the case of Greece the table on p. 608 shows the relative importance of these countries both in imports and exports. In Turkey, the United Kingdom takes the first place among the countries which furnish the imports, but it is rivalled by France among those which receive the exports. In Bulgaria, Austria and the United Kingdom are the chief rivals, the Austrian trade being favoured by the Danube, while the British trade has to be carried on mainly by the southern and eastern ports, among which last may be included, however, the Roumanian port of Braila, on the Danube, by means of which a considerable portion of the foreign commerce of Bulgaria is conducted. Part of the commerce of the north-west, including part of that of the interior of Servia, is carried on by the Save as far as Sissek (at the confluence of the Kulpa), and thence by rail to Fiume. The great bulk of the trade of Servia is with Austria.

689. The following is a list of the chief seaports of the Balkan Peninsula:—(1.) **In Turkey, CONSTANTINOPLE,**[1] on the strait of the same name; **Rodosto,** on the Sea of Marmora; **Gallipoli,** at the inner end of the Dardanelles; **Dede Agach** and **Salonica,** on the Ægean Sea; **Prevesa,** at the mouth of the Gulf of Arta, on the Ionian Sea; and **Durazzo** (the ancient Dyrrhachium), on the Adriatic; **Candia** (Megalokastro) and **Canea,** on the island of Crete. **Scutari** in Northern Albania was at one time a seaport accessible to large vessels, but the Boyana, the outlet of Lake Scutari, has been obstructed by deposits brought down by an arm of the Black Drin, which now joins it, to such an extent that sea-going vessels can no longer reach it at all. (2.) **In Greece, Volo,** on the gulf of the same name, the port of Thessaly; **Piræus,** the port of Athens; **Nauplia, Marathonisi,** and **Kalamata,** on the three gulfs of the Morea; **Patras,** on the Gulf of Corinth; **Corfu, Cephalonia,** and **Zante,** on the three Ionian islands of the same name, and **Syra,** or **Hermoupolis,** on the island of Syra, among the Cyclades.

[1] Population, 1,200,000.

(3.) In **Bulgaria, Varna.** (4.) In **Eastern Roumelia, Burgas,** where a new harbour was opened in 1903. (5.) In **Montenegro, Antivari** (connected by rail with L. Scutari in December 1908), and **Dulcigno.**

690. Of the Turkish ports it need hardly be stated that **CONSTANTINOPLE** is by far the most important. The date of the oldest commercial settlement on the site occupied by the town is merely a matter of conjecture, but it is certain that the peculiar advantages of the situation must have attracted the attention of maritime nations at a very early period. A gently rising piece of ground, forming a peninsula between the Sea of Marmora on the south, the Bosporus on the east, and the magnificent natural harbour of the Golden Horn on the north-east, afforded an admirable site for the nucleus of a great city, and the situation between two seas and two continents, together with the harbour, fitted it to be a great seaport. The defective government and the degraded state of civilisation in the regions on which its commerce depends prevent it from attaining a rank among the seaports of the world answering to these natural advantages. It is noteworthy regarding the commerce of the port that the exports are to a very large extent of Asiatic origin. Mohair, which forms the chief export, is entirely brought from Asia Minor; so also are yellow berries, gum tragacanth, and a large part of the wool, seeds and cereals, galls, &c. The carpets exported from Constantinople are to a large extent brought from Persia and the Caucasus, as well as Asia Minor. The shipping between the Sea of Marmora generally and the Ægean is a good deal hampered by the heavy charges levied by the tug-boats used in towing vessels through the Dardanelles. Next in importance to Constantinople among Turkish seaports is **SALONICA**, for the reason already indicated (680, 688).

691. Of the **Greek ports,** Piræus, Patras, Corfu, and Syra are the chief, **Piræus** ranking first in the value of the imports; Patras, the chief place of export of currants, first as regards exports. **Patras, Corfu,** and **Syra** are free ports, and the last-mentioned is on that account, as well as on account of its excellent harbour and central situation in the Ægean, a great place of call for vessels trading with the Levant.

692. The chief **inland towns** of the peninsula are **Adrianople,** at the confluence of the Maritsa and Tunja; **Philippopolis,** higher up on the Maritsa, capital of Eastern Roumelia; **Sofia,** capital of Bulgaria; **Belgrade** and **Nish** in Servia, the former the capital of the kingdom, and an important fortress and river port at the confluence of the Danube and the Save; **Sarajevo,** the capital of Bosnia; **Mostar,** that of Herzegovina; **ATHENS,** that of Greece; **Larissa,** the chief town of the vale of Thessaly in northern Greece; and **Yanina,** in the largest plain of southern Albania. The prosperity of Nish is such as might be expected from its position at the fork of the railways from central Europe to the Black Sea and the Ægean.

ASIA

693. Asia is the **largest and most populous of the continents**, but its population is very unequally distributed. Though, taken as a whole, Asia has a much smaller population relatively to area than Europe (about 46 as against 90 to the square mile), four countries in the south-east of Asia, namely India, Java, China, and Japan, with an aggregate area equal to about five-sixths of that of Europe, have a population about twice as great as the population of that continent. The explanation of this difference in the distribution of the population is to be found mainly in differences of climate; and these differences, again, are due to situation and superficial configuration.

694. The vast size and the shape of the continent necessarily have the effect of placing the central areas at a great distance from the sea, the chief source of moisture (39); but it is to be noted that the existence of another continent continuous with it in the west, and a third lying to the south-west, has an important bearing on the **climate** of Asia. The European continent receives, to the loss of Asia, the bulk of the moisture brought by south-west winds from the North Atlantic Ocean, and the continent of Africa has a detrimental effect on the Asiatic rainfall in two ways. First, being situated in latitudes in which there is great rarefaction of the air on the land, and consequently a strong indraught of air from the sea, it diminishes the influx of sea air into the neighbouring parts of Asia (35). Secondly, it prevents such sea-winds as do blow over the south-west of Asia from being as heavily charged with moisture as otherwise they would be.

Hence it is that the **monsoons** (39) begin, we may say, to the east of the Indus, and hence, too, that these seasonal winds are so all-important in relation to the climate and production of Asia.

695. The **superficial configuration** of the continent intensifies the contrast between south-eastern and Central Asia. The **Himalayas**, the loftiest mountain range in the world, arrest the summer monsoons of India, or at least deprive them of nearly all their moisture. North of these mountains, the tableland of Tibet, varying from about 10,000 to 18,000 feet in height, spreads out northwards to the **Altyn Tagh** and **Nan-Shan Mountains**, and on the east and south-east breaks up into numerous mountain ranges, which also help to deprive the

southern monsoon of moisture. Still more effectually deprived of this essential of life are the lower tablelands to the north, varying from about 2,200 to upwards of 4,000 feet in height, and extending to the mountains of Siberia and central Asia.

696. **Climate. Outside of the monsoon region** there is probably not one million square miles, or, say, only about one-tenth of this section of the continent, in which the total rainfall of the year amounts to as much as 16 inches (486). The areas in which that amount is exceeded lie chiefly in the parts traversed by mountains in the south-west (western Persia, Caucasia and Armenia, Asia Minor) and in Siberia, in the middle and upper parts of the basin of the Yenisei, and in that of the Ob from about lat. 56° to 62°.

696*a*. In the drier parts of the continent there are various proofs that **at one time the climate was moister than it is at present**, and in some of these districts the population was in consequence at one time more numerous. The **Sea of Aral** is rapidly diminishing in size. **Lake Sari-Kamish**, once a lake of 4,400 square miles in extent, between that sea and the Caspian, is now divided up into three separate lakes, the aggregate area of which is less than 200 square miles. A series of maps dating back to the year 1784 show that within the last hundred years or so the lakes between the Irtish and Ob about 55° N. have all shrunk in dimensions, in some cases from an area of 800–500 square miles to groups of small ponds one or two miles wide. In the **basin of the Tarim** (Eastern Turkistan) numerous ruins and old river-courses testify to the fact of there having been in that region a much greater extent of habitable and inhabited land in former centuries than there is now. In the **Thur, or Indian Desert**, there are likewise beds of rivers long dried up, seeming to show 'that the waters of the Indus, or of some of its branches, once flowed through it, fertilising what is now a wilderness.' [1]

697. The **monsoon region** in the south-east of Asia has, however, from the very dawn of history been a populous and productive part of the continent, and its commodities have been all the more valued in Europe from being the products of a warmer climate, and hence of a different nature from those native to the west. Indian spices, drugs, and dyes, and Chinese silks, together with precious stones, have been eagerly sought after by European merchants since the time of the Romans, and some of them found their way to the Mediterranean even in the time of the Phœnicians. The favourite routes by which these commodities were exchanged for European goods differed at different periods. In the time of the Romans Egypt was the transit land

[1] Hunter's *Gazetteer of India*, 2nd ed., xiii. p. 262. How far such changes may be taken to indicate a more or less continuous process of desiccation is very uncertain. Much attention has been excited in recent years by the evidence adduced by Ed. Brückner of rainfall fluctuations in many parts of the world extending over a period of 35 years. See his *Klimaschwankungen seit* 1700 (Vienna, 1890).

for Indian and other eastern products, and it was in a large measure this circumstance that gave to Alexandria its ancient commercial importance. In the time of Justinian (sixth century A.D.) the Persians had the monopoly of the silk trade. Chinese silks were received either at ports on the Indian Ocean, or by land routes through the Tarim basin by Yarkand, and the Pamir and Kashgar, and the Terek or other passes across the Tian-Shan Mountains (see map, p. 859). About the middle of the seventh century the overthrow of the Persian dynasty of the Sassanidæ by the Mohammedans destroyed the Persian monopoly of the eastern trade. Soon the Red Sea route came to be preferred once more for eastern commerce, though it had a rival in the Persian Gulf. By the former route the eastern goods were sometimes landed on the western shore of the Red Sea and carried to Cairo or Alexandria; sometimes they were conveyed across the Isthmus of Suez; and sometimes from ports on the eastern shore of the Red Sea through Syria. By the Persian Gulf route, which attained a high degree of importance in crusading times (the twelfth and thirteenth centuries), commodities reached the Mediterranean by Damascus or Aleppo. In the fourteenth and part of the fifteenth century another route was much frequented—that, namely, through the southern portion of what is now European Russia. That region was then in the hands of Tatar tribes, who for a time maintained friendly relations with the merchants of Italy. The Venetians and the Genoese had colonies on the Black Sea and the Sea of Azof. The Genoese were long established at **Kaffa** (now again called Theodosia or Feodosia) on the southern shore of the Crimea. Both had colonies at *Vosporo* (now **Kerch**) at the entrance to the Sea of Azof, and at *Tana* (now **Azof**) on the Don. From Tana the rivers afforded access to the interior of Russia. Valuable furs, besides grain and forest products, were the principal commodities obtained in this trade, but long inland journeys were also pursued. An eastern route to Astrakhan might be followed, or the traders might ascend the Don to the angle at which it approaches the Volga and thence go eastwards through the Tatar capital of *Sarai* (on the Akhtuba arm of the Volga about 45 miles east of Tsaritsin), then round the north of the Caspian to the valley of the Amu, and up that valley across the Bamian Pass through Kabul to India, or across the Amu and the Sir, and then by way of Dzungaria to China (see maps, pp. 859 and 864). Early in the fifteenth century the Black Sea and Caspian routes became greatly hampered through political events, and the fall of Constantinople in 1458 finally restored to the Syrian (Persian Gulf) and Egyptian (Red Sea) routes all their early importance for eastern traffic. This they retained till the discovery of the sea-way to India (**100**), at the close of the century. The opening of the Suez Canal in 1869 has been the means of restoring the early pre-eminence of the Red Sea route. The rapid increase in the amount of commerce carried on by that canal is shown in the table in the

Appendix. To British shipping and commerce in particular this canal has been of the highest consequence, through the opening of shorter sea-routes to India and other eastern dependencies of the empire, as well as to Australia. It is true that the canal has at the same time again enabled Mediterranean sea-ports to supply themselves directly with many eastern commodities which they formerly received indirectly from London and other British ports; but it is noteworthy that, as shown in the table in the Appendix exhibiting the proportion of British export trade in foreign and colonial products, the Suez Canal traffic has not yet had much, if any, effect in diminishing the aggregate value of the commerce for which Great Britain is the intermediary.

COUNTRIES OUTSIDE OF THE MONSOON REGION

698. SIBERIA. This region, composed mainly of a vast plain in the north and west, and of tablelands and mountainous country in the east and south-east, and extending in all over an area of nearly 5,000,000 square miles, has been gradually acquired and colonised by Russia since the close of the sixteenth century. Deported criminals and political offenders form a large element of the population, but free settlers are arriving from Russia in greater and greater numbers. These **settlers** are chiefly **Russian peasants**, whose principal inducement to emigrate is the hope of obtaining larger pieces of land in place of the small holdings (generally little more than five acres in extent) into which most of the peasant properties of Russia are parcelled out. The total Russian population of Siberia amounted at the census of 1897 to nearly 5,000,000, **two-thirds** of whom were in **Western Siberia**, which is, roughly speaking, synonymous with the **basin of the Ob** (divided into the provinces of Tobolsk and Tomsk). The native population amounted at the same date to about three-quarters of a million, of whom little more than one-sixth inhabited Western Siberia. Outside of that region the settlers are mainly confined to the neighbourhood of the chief roads and the borders of the rivers. The chief **native tribes** are the **Kirghiz** and **Buryats**, both of which form a compact population, with all the signs of enduring vigour.

698*a*. The first Russian conquest beyond the Urals was made in 1581 under a Cossack leader called Yermak. The expedition was primarily in the interest of a family of Russian fur-traders, but it received the sanction of the Russian government, and politically was merely a continuation of the process of expansion by which the grand princes of Moscow gradually drove back or subjugated the Tatar invaders of the thirteenth century. The immediate result of the first invasion of Yermak was the fall of the Tatar capital, *Sibir* on the Irtish, about ten miles above the present Tobolsk, which was founded soon after. Small parties of Cossacks, living the life of backwoodsmen, gradually pushed eastwards along the rivers, and in little more than fifty years after the conquest of Sibir a blockhouse was erected (1632) on the present site of Yakutsk on the Lena. Before the close of that century the Russians had come in contact with the Chinese on the

Amur, but a pause of about 150 years took place in their eastern expansion, after they had in 1689, in the treaty of Nerchinsk, relinquished all claim to the Amur. Further expansion in this direction took place during the Crimean war, and in 1858 the Chinese agreed in the treaty of Aigun to recognise the Amur and Usuri and a line drawn from the head of the Usuri southwards to Korea as the Russian frontier. In 1898 the Russians obtained from the Chinese a lease of the extremity of the Liautung peninsula, including Port Arthur and Talienwan Bay. They then converted Port Arthur into a formidable stronghold, and opened the commercial port of Dalny, a little to the east. Having also obtained the right to lay the final portion of the Trans-Siberian railway through Manchuria to these termini, they succeeded in procuring for themselves military predominance in that province till the war with Japan in 1904–5, at the close of which the Russian lease was transferred to Japan.

699. Agriculture is the **principal occupation** of the people, and grain has already risen to the rank of the chief export. The whole of the southern belt as far as 60° N. is described by Russian authorities as being more or less fit for cultivation, though large parts of this tract will first have to be cleared of forests, and other areas are at present marsh-land. The districts traversed by the westernmost section of the Siberian railway in about 55° N. are first level afterwards rolling prairies similar to those of the Canadian north-west. The prairies on the banks of the upper Yenisei, in the district of **Minusinsk**, are said to vie in fertility with those of the Red River valley (**149**), but are even yet too remote from any great market to be settled largely by wheat-growers (**702***a*). The whole of Western Siberia appears to have an even better climate, latitude for latitude, than the Canadian north-west, at least as regards temperature. The curves showing the monthly mean temperatures for Omsk and Irkutsk very nearly coincide with that for Winnipeg in Manitoba, all three rising with remarkable regularity from a minimum of between −3° and −6° F. in January to a maximum of between 65° and 69° F. in July, and falling with corresponding regularity in the second half of the year. In making this comparison it should be noted that Irkutsk (lat. 52° 16′ N., altitude 1,540 feet) is nearly 2½ degrees further north and 800 feet higher than Winnipeg, and that Omsk, though about 500 feet lower than Winnipeg, is 5 degrees further north. Semipalatinsk, which differs little from Winnipeg in latitude or altitude, has a curve rising from 0° to 74° F. The great drawback of the climate is that which it shares with Manitoba through lying, as described in par. **141**, on the margin of adequate rainfall. There is consequently a great variation in the amount of the produce from year to year, the crops of cereals in a good year being about three times as heavy as in a bad year. In Western Siberia the chief cereal is wheat. Rye and oats are largely grown in all the settled districts. North of this cultivable

region the chief products are those of the **forests**, including **furs (351)**, and still further north lie the **tundras**, in which the only article of value in commerce is the **fossil ivory** referred to in par. **357**.

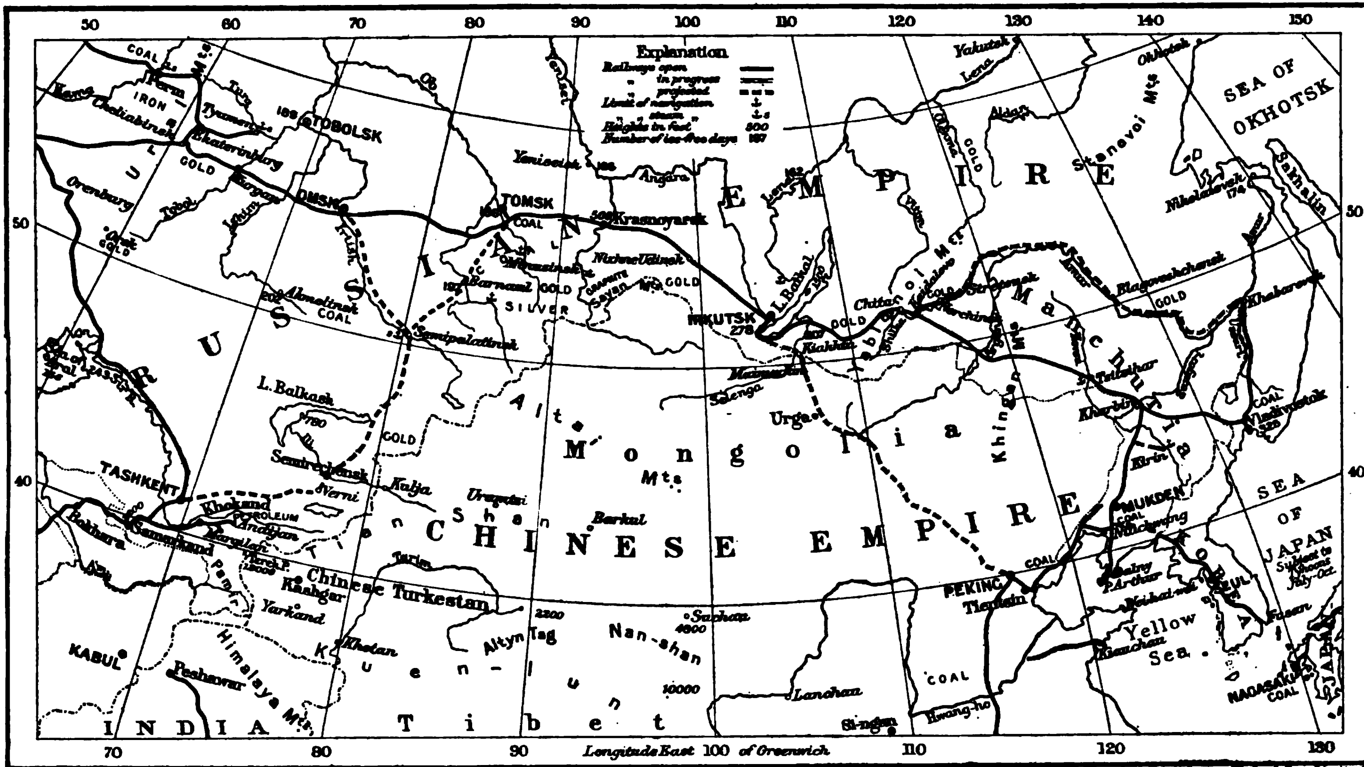
700. The **mineral wealth** of Siberia is likewise very abundant. Siberia produces at least three-fourths of the Russian **gold (410)**, and two-thirds of the Russian silver. The chief **goldfields** being at the present time in the east—in **Transbaikal**, in the **basin of the Amur**, and in that of the Olekma, a right-bank tributary of the **Lena**. These goldfields are mainly alluvial, and owe their preservation in a large measure to the ground frosts that have held them bound since the Ice Age. All the gold of Siberia has to pass through the government laboratories of Irkutsk, Tomsk, or Ekaterinburg, and thence to the mint at St. Petersburg. Silver is produced chiefly in the Altai region. **Graphite** abounds in the mountains in the south of the **Yenisei basin**, but owing to the competition of other more accessible sources of supply (**423·14**) this mineral is now little worked. The country also contains enormous deposits of iron ore, lead, and copper, besides coal. One **coalfield**, that of the **Kusnetsk** basin, containing also iron ore, and partially covered by forests, covers an area of upwards of 16,000 square miles in the upper part of the **basin of the Tom**. But the coal, both of this field and of others further west near Pavlodar on the Irtish and in Akmolinsk, where the quantity is also very great, is very poor in quality. A little coal is mined on Sakhalin.

701. The chief obstacle to the commercial development of Siberia has been the **deficiency of communications**. The great **navigable rivers**, the Lena, Yenisei, and Ob, draining into the Arctic Ocean, and the Amur, draining into the Pacific Ocean (Sea of Okhotsk), afford with their numerous navigable tributaries a large extent of waterways. To complete the line of water communication between Lake Baikal and the Urals, a **canal** has been made in about lat. 58° N. connecting the basins of the Yenisei and Ob, and the **railway to Perm** across the Urals now begins at **Tyumen**, the limit of navigation on one of the western tributaries of the Tobol. But this route is impeded by **rapids on the Angara**, the outlet of Lake Baikal; it is stopped by ice for five and a half or six months in every year; it is at best a very circuitous route; and, lastly, it carries the principal products of Siberia to a land which abounds in similar products, and in which, accordingly, they have a smaller value than they would have elsewhere. On this account it is especially unfortunate for Siberia that its chief navigable streams open into seas so long closed by ice that it is extremely difficult to establish communication by sea with their mouths. Since 1874 repeated attempts have been made by English, German, Danish, and other seamen to utilise this route for commerce with the west of Europe. In this trade the pioneer was the Englishman Captain Wiggins, who has also been the most persevering in his efforts to establish the route, but though he has succeeded in taking his ship as high as Yeniseisk, on

the Yenisei, and there sold for 12*l.* a ton salt bought in Newcastle at 9*s.* or 10*s.* a ton, it is admitted that this route cannot be made commercially successful except by the remission of customs duties.

702. The map opposite shows the route of the Trans-Siberian railway, which has been entirely laid since the first edition of this work. The first stone of the railway was laid at Vladivostok on May 19, 1891, by the Grand Duke Nicholas, now the Tsar Nicholas II., and the line then begun was ultimately continued northwards to Khabarovsk on the Amur. The westernmost section, Chelyabinsk to the Ob, was opened in December 1895, and the next section to Irkutsk was opened in the summer of 1898. Originally the line was intended to follow the valley of the Amur down to Khabarovsk, but the difficulties of construction in the easternmost section of this route, together with the small prospect of economic development in that region, led to the change of route through Manchuria. The line was continued eastwards to Sryetensk or Stryetensk, at the head of navigation on the Shilka, but the railway to the seaboard was made to branch off at Manchuria, 177 miles by rail above Sryetensk. It thence runs south-eastwards to Harbin in Manchuria, and from Harbin south to Port Arthur and Tairen (Ta-lien or Dalny), and east to Nikolskoye on the Vladivostok-Khabarovsk line. The line was completed before the end of 1902, except for a break at Lake Baikal. For some time trains were carried across Lake Baikal in large ferry-boats, but before the end of 1904 the very difficult section round the south end of Lake Baikal was completed. The total length of the railway from Chelyabinsk to Port Arthur is 4,102 miles, to Vladivostok, 3,902 miles, from Moscow by Samara, Ufa, Zlato-ust and Chelyabinsk to Port Arthur 5,475 miles, from St. Petersburg 5,882 miles. In the western section of the line the gradients are naturally easy, nowhere as far as the Ob exceeding 1 in 185. Further east they rise to 1 in 66, and additional difficulties in the construction of the line were presented by the numerous rivers to be crossed. The Yablonoi Mountains east of Lake Baikal are crossed at the height of about 3,400 feet, the temperature there rising in June and July to 77° F. by day and falling to 28° F. at night. An important connection with the Siberian railway in European Russia is that by the Tyumen-Perm line, which since 1900 has been continued to Kotlas, at the point where the Sukhona and Vichegda unite to form the Northern Dvina, by means of which access is had to Archangel. Since 1906 this line has also been connected with St. Petersburg by a line running nearly due west from Perm through Vyatka. This Perm-Vyatka line is 1,070 miles long, and thereby St. Petersburg has been brought within a distance of about 5,500 miles from Vladivostok, 5,700 from Tairen, and 6,000 from Peking by Niu-chwang and Tien-tsin.[1]

[1] See on the Trans-Siberian Railway, *For. Off. Report*, *Miscel. Ser.* nos. 533, 585. The construction of the section down the Amur to Khabarovsk is now (1908) projected. In time Peking is now only 14 days from London, Shanghai 21.



Statute Miles
100 0 200 400

Longmans Green & Co., London. New York & Bombay.

Natural Scale
1:36,000,000

702a. Since the construction of the Trans-Siberian railway began there has been a rapid immigration[1] into Siberia from Russia, and a considerable development of trade westwards. In Western Siberia the settlers are allotted free grants of forty acres of land and are exempted from taxes for three years. About half the quantity of goods carried on the Siberian railway consists of grain, chiefly wheat.[2] Next in importance are animals and animal produce (meat, butter,[3] hides, tallow, wool, dead game), and tea. Shortly after the completion of the railway a tea-train of twenty-four waggons of 10 tons each laden with tea from Hankow started from Dalny for Russia in Europe. Passengers are conveyed in luxurious carriages, and Shanghai, Nagasaki, or Yokohama can be reached by this route in eighteen to twenty days.

703. The chief towns are shown on the map on p. 359. At the census of 1897 the only two with a population above 50,000 were **Tomsk**, capital of Western, and **Irkutsk**, capital of Eastern Siberia. Tomsk is the seat of a university. **Kiakhta**, on the Siberian frontier opposite the Chinese (Mongolian) town of Maimachin, was formerly the centre of a large caravan trade with China, importing brick-tea and exporting furs and other Siberian products.

704. **RUSSIAN CENTRAL ASIA.** To the south of Western Siberia the greater part of the territory west and north of the Chinese, Indian, Afghan, and Persian frontiers is either directly under Russian administration or under Russian influence. There still remain the two semi-independent **khanates of Khiva** (now confined to the west bank of the Amu) and **Bokhara**, which includes, in the south-east, part of the district of the Pamirs, but since January, 1895, a single customs frontier has stretched from the Caspian to Chinese Turkistan, embracing both these states. This district, which contains the head-waters of the Amu, is sometimes called the **Pamir Plateau**, but it is, in fact, a series of lofty plateaux, in some places more than 15,000 feet in height, furrowed by valleys in the west, but descending on the east

[1] In 1895 the number of immigrants exceeded 100,000, and in several subsequent years it has exceeded 200,000, the great majority remaining in the western governments. In 1908 the number of immigrants exceeded 758,000, of whom, for various reasons, 121,000 returned, leaving a balance of 637,000 settlers (699).

[2] In 1898–1900 the average quantity of grain carried was about 300,000 tons, and in 1900 more than half of this was wheat, more than nine-tenths of which came from the section west of the Ishim, that is, within about 2,300 miles of the Baltic ports, a distance that may be compared with that of 1,424 miles, the distance from Winnipeg to Montreal; 1,781 miles, Regina to Montreal; and 2,031 miles, Prince Albert to Montreal. In 1900 the total quantity of Siberian grain that reached the Baltic ports and Archangel was about 60,000 tons, which, if it was all wheat, would amount to about 2,000,000 bushels. In 1901 about 97,000 tons of grain (? 3,500,000 bushels of wheat) reached Archangel alone.

[3] The trade in butter, carried in refrigerator cars, has been developed with remarkable rapidity by the opening of the Siberian railway, and this commodity reaches Europe from much greater distances than wheat—apparently from as far east as the Minusinsk district or about 3,000 miles from the Baltic. The quantity of Siberian butter exported increased from 5½ million lbs. in 1898 to about 124 million lbs. in 1908 (estimated at over 136 million lbs. in 1909).

with remarkable abruptness to the plains of Eastern Turkistan. It is a region difficult of access from all sides, and yet one across which there are commercial routes that have often attained a high degree of importance in the commerce between eastern Asia and Europe (697). It has only a scanty population of pastoral tribes. The portion of the Pamirs south of the Oxus and between the Panja headwater of that river and the Hindu Kush, belongs politically to Afghanistan. An eastern strip is Chinese.

705. The **western part** of Russian Central Asia consists mainly of plains and low tablelands, **mostly desert.** Throughout the region, indeed, cultivation keeps for the most part to the neighbourhood of the mountains, and where carried on at a distance from the mountains it is only by the favour of rivers which have gathered volume enough in the mountainous region to reach a considerable distance into the plains. Three rivers reach large salt lakes. These are the Ili, which enters **Lake Balkhash** through a swampy delta, the **Sir,** or Jaxartes, and the **Amu,** or Oxus, which flow into the **Sea of Aral.** The **Zerafshan,** the **Murghab,** and the **Heri Rud,** on the other hand, all **dry up in the sands.** Cultivation is carried on where possible along the banks of these rivers and their tributaries, and where the nature of the ground admits of it large tracts are irrigated by means of their waters. The area of the **Merv oasis,** which uses up the water at the end of the Murghab, is about 1,700 square miles, that is, less than that of the county of Lancaster; but the actually cultivated portion of this is scarcely one-third of the whole, say, about as large an area as that of the county of Worcester.

Besides Merv, the principal **oases** are **Khiva,** fed by streams drawn from the Lower Amu; **Bokhara,** at the end of the Zerafshan; **Samarkand,** higher up on the same river, so that an extension of this oasis involves a diminution of the water-supply for Bokhara; **TASHKENT,** watered by streams on the right bank of the Sir; Khojent, and Kokand, on or near the Sir, higher up.

706. The valleys lying among the eastern mountains, the **valley of the Ili,** that round Lake Issyk Kul (both in Semirechensk), and the upper **valley of the Sir (Ferghana),** are not only plentifully watered, but blessed with a **black** soil as rich as that of southern Russia; and to these valleys, accordingly, Russian immigrants are rapidly streaming.

707. The Sir and Amu serve as means of carriage for the products of the region, but the commercial development of Russian Central Asia has been greatly promoted by the construction of two railways. The older is the **Trans-Caspian Railway,** running from **Krasnovodsk,** on the Caspian, along the base of the mountains in the north-east of Persia, thence by the oases of Tejen, Merv, Charjui (where the railway crosses the Amu), and Bokhara, to **Samarkand** (which was reached in 1888), and thence by Khojent to Kokand, Margilan, and Andizhan in Ferghana. Branches, each about 200 miles long, run south from Merv

to Kushk (close to the Afghan frontier), and north from the Sir valley to Tashkent. The other is the line from Orenburg to Tashkent (986a).

708. The chief product which this railway serves to transport from central Asia, including northern Persia and Afghanistan, is cotton, which is cultivated throughout the region, but chiefly in the most distant province, that of Ferghana to the north of 40° N. The cotton is mainly produced from American seed, and is of excellent quality.[1] Cotton manufactures have also been started. An imperial mill established on the Tsar's private estates on the Murghab is working with great success.

709. Though the extension of Russian rule and influence in central Asia is regarded with jealousy in the British Isles on political grounds, it ought never to be forgotten that the establishment of Russian authority in these regions has been in some respects highly salutary, and, what is of special importance with reference to the subject under consideration in this book, highly favourable to production and commerce.

710. CAUCASIA. The region so called comprises all the Russian territory on both sides of the Caucasus, and thus includes part of the tableland of Armenia. The richest part of this region is that which occupies the series of valleys between the chain of the Caucasus and the tablelands to the south. It is not only that part which has the climate most favourable to vegetation (a region, accordingly, of forests, vineyards, cornfields, cotton and tobacco plantations, and pastures), but also that which contains the bulk of the enormous mineral wealth of the Caucasus. Commercially, the mineral product at present of most importance is petroleum (403), but manganese is largely obtained in the government of Kutais (on the Black Sea), copper in that of Elizabetpol in the east; and there are vast supplies of rich iron ore both in the east and west, hitherto almost untouched. A coalfield in Kutais, containing excellent coal, has now been connected by a branch line of railway with the main line which traverses the series of valleys from Baku on the Caspian to Poti and Batum on the Black Sea. On the Armenian tableland there are enormous supplies of rock-salt. Among agricultural products may be mentioned wool (some of fine quality), which is exported mainly to France (Marseilles). The chief town in Caucasia is TIFLIS, on the Kur. It is connected by a road through the gorge of Dariel with Vladikavkaz, the terminus of the Russian railway system on the north of the Caucasus. BAKU, the centre of the petroleum district, is now beginning to rival Tiflis in population and trade. The main line of communication between Baku and the west has been improved by the piercing of a railway tunnel

[1] In 1900 the cotton introduced into European Russia from this region considerably exceeded 200 million lbs., equal to about two-thirds of Russia's total import. More than half of the amount coming from central Asia is annually derived from the province of Ferghana, and nearly three-fourths is grown from American seed. In 1908 the crop of central Asia was estimated at 380 million lbs.

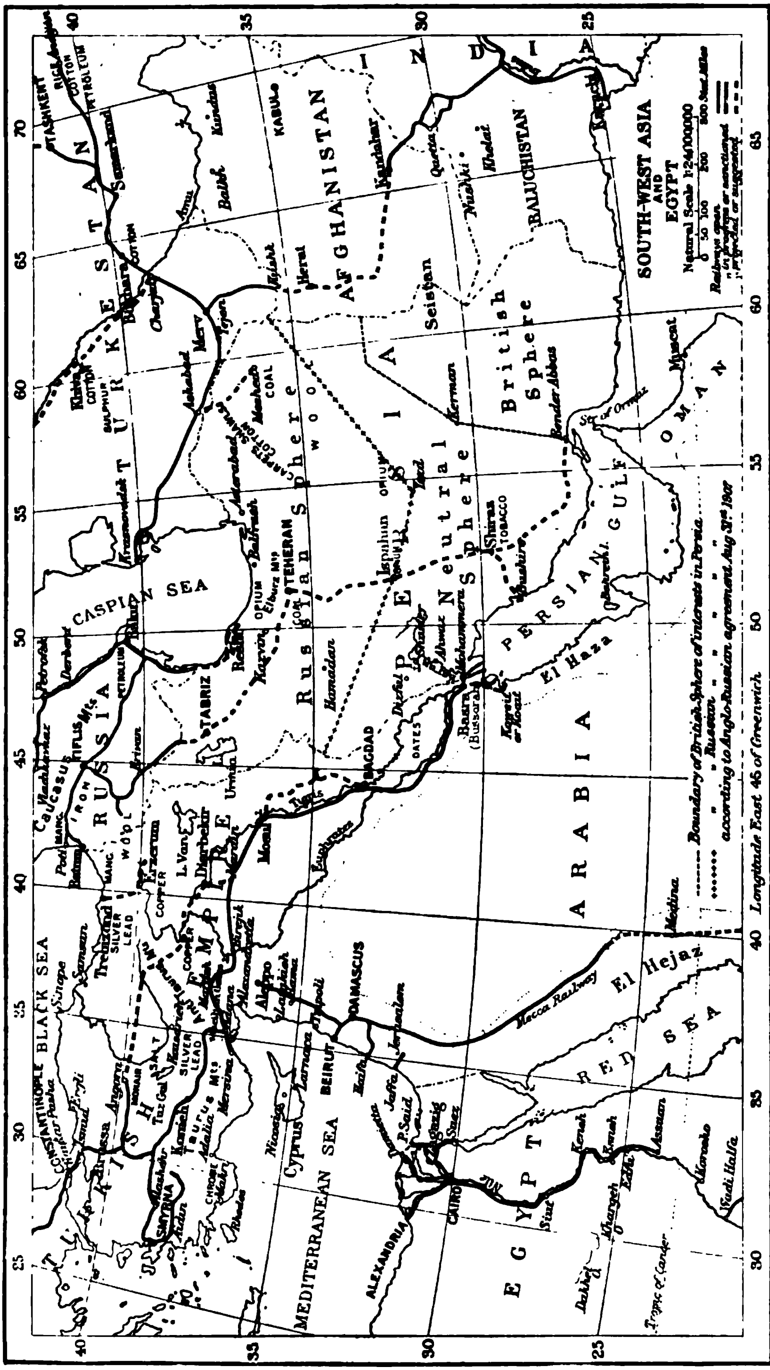
under the **Suram Pass** (on the water-parting between the Kur and the Rion), where the gradient is so steep that traffic was greatly hindered. **Batum**, by the terms of the Treaty of Berlin (1878), was made a free port, and sealed wagons containing goods not intended for Russian consumption were formerly allowed to pass over the Trans-Caucasian railway duty-free, but these privileges were abolished in 1886. The connection of the admirable port of **Novorossiisk**, at the west end of the Caucasus, with the Russian railway system has made of it a rapidly growing grain port, whose one serious drawback is its exposure to cold northerly winds, which in winter cause the rigging of vessels in the harbour to be covered with frozen spray. (See map, pp. 810–11.)

711. TURKEY IN ASIA. This includes Asia Minor, part of Armenia, Syria and Palestine, Mesopotamia (including Irak Arabi), and extensive coast-strips in Arabia.

712. Asia Minor is a tableland about three thousand feet in height, skirted by valleys and plains, some of which almost vie in fertility and beauty with the huertas of Spain. The heart of the tableland is for the most part arid, at best a rolling steppe, and in great part desert. Even the largest rivers of the peninsula (the Kizil Irmak, Sakaria, Gediz Chai) are too scantily supplied with water to be of much service as means of communication. Though the descent from the tableland to the valleys is in many places abrupt, there are numerous openings through which roads and railways could be constructed, and numerous remains of old Roman roads testify to the more advanced state of civilisation attained here in ancient times. The tableland is most closely shut off from the lowlands by the range of **Taurus** in the south-east, and hence the pass through these mountains known as the **Cilician Gates**, leading down through a gorge cut by one of the head-streams of the Cydnus to the **valley of Tarsus and Adana** (**712*a***), is a physical feature worthy of special note.

712*a*. In the interior trade is still largely carried on by **camel caravans**, but the map on p. 864 shows how railways are extending. Of the western railways that converge on the port of Smyrna the southern, ascending the valley of the ancient *Meander* past Aidin, with the branch ascending that of the ancient *Cayster*, is British; the others are French, but are worked along with all the other railways in the north-west of Asia Minor by the German Anatolian Railway Company, which constructed the railway starting from the new port of **Haidar Pasha**,[1] near Skutari, opposite Constantinople, and forks at Eskishehr for Angora and Konia. These lines were built under a government guarantee, which so far has involved an annual payment levied from the Turkish tax-payers. The line to **Angora** was completed in 1892,

[1] Great improvements have been made at Haidar Pasha, to which port the German Anatolian Company conveys trains by train-ferries from Europe to their Asiatic lines, which are on the same gauge as those of Germany and central Europe generally.



Longmans, Green & Co., London, New York, Bombay & Calcutta.

and opens up a district yielding, among other products, opium, meerschaum (at Eskishehr), and mohair (**210**). It is proposed to continue this line eastwards by Sivas to **Diarbekir**, passing through a district rich in silver, lead, and copper. The **Konia** line was completed in 1896, and since then there has been a considerable immigration from Europe to the district lying south-west of its terminus near the Beishehr or Kirili Lake, whose waters it has been proposed to use for irrigation.[1] **Alashehr**, on the line that now joins this line at **Afiun Karahissar** ('Opium Black Castle'), is the ancient *Philadelphia*. The projected continuation of the Konia line shown on the map is what is known as the Baghdad Railway. **Brussa**, the terminus of the short line from Mudania, on the Sea of Marmora, has for centuries been a centre of silk-production and of the working of silk both of local and distant origin. In the south-east of the peninsula a **railway** from **Mersina to Adana**, on the Seihun (ancient Sarus), was completed in 1886. This railway **opens up a valley of remarkable fertility**, noted now, as in ancient times, for its extraordinarily abundant crops of wheat, and proved by trial to be excellently suited for the production of cotton, raw silk, sesame (**330**), and other products. The sole right to construct railways in the north-east of Asia Minor has been conceded to Russia.

712*b*. The port of **SMYRNA** possesses a fine natural harbour, which remains in the neighbourhood of the town as commodious as ever it was, though the approach to it was in danger of being blocked by the deposits poured in by the Gediz Chai (*Hermus*) on the north. This danger, however, has been removed by diverting the mouth of that river westwards. The nature of the products of the peninsula and its waters is indicated by the chief **exports of** Smyrna, the first ten in the order of importance being as follows:—raisins, valonia, cotton, opium, figs, barley (of excellent quality), liquorice, carpets, wool, sponges. The absence of oranges may be noted. The rarity of orange-culture in the peninsula is, in fact, one of the indications of the easterly increase of cold in winter, frequently referred to (**36**, &c.). It has already been mentioned that a considerable proportion of the products of Asia Minor reach western Europe by way of Constantinople (**690**), being sent thither from the **Black Sea ports of Trebizond, Samsun**, Sinope, and Eregli, as well as from Skutari and Ismid. From **Trebizond** an important **inland trade** is carried on by way of Erzerum in Armenia to Mesopotamia and northern Persia. **Kharput**, to the south of the Eastern Euphrates, about sixty miles north by west of Diarbekir, is another important centre of local trade.

713. Syria, like Asia Minor, is a province presenting **numberless indications of the decline following upon misgovernment.** The population is estimated to be less than a tenth of what it once amounted to. The soil, in many places remarkably fertile, is to a large extent impaired by neglect. Terraces for cultivation on the hill-sides have been

[1] See Hogarth, *The Near East*, p. 120.

allowed to fall into ruin. The agricultural products are those characteristic of the Mediterranean generally; but the **silk** of the **Lebanon**, the **tobacco** of **Latakieh**, and the **oranges** of **Jaffa** may be specially mentioned. **Soap-making** is a locally characteristic industry, inasmuch as the materials are supplied by the olive-tree and soda-yielding plants which grow on the many stretches of saline soil (455).

713*a*. The most populous and flourishing part of Syria is the district between Lebanon and the coast, where **BEIRUT** has long been the chief port. A good road has long connected this port with **DAMASCUS**, crossing the Lebanon at the height of 5,200 feet and passing through Anti-Lebanon in the gorge of the Barada. Since 1895 a railway, built with French capital, has followed the same route, and a line subsequently built now runs from Damascus southwards to the wheat-growing district of **Hauran**, in which there is still room for extensive settlement. The construction of these railways has not yet led, however, to any great development of trade, the heavy gradients on this route no doubt being antagonistic to the conveyance of such a bulky commodity as wheat. For the carriage of this product the railway from **Haifa**, at the base of Mount Carmel, through the Hauran to Damascus, which was projected and even begun by an English company but which the Turkish government proposes to acquire and complete, would probably be better suited, and if the harbour works there projected were carried out, Haifa would seem likely to replace Beirut as the chief port of this seaboard. **Acre**, to the north of the Bay of Carmel, has some local trade. North of Beirut the chief port is **Alexandretta** or Iskenderun, the port of **ALEPPO** (**716*b***). **Jaffa** or Joppa is the port of **Jerusalem**, with which it is connected by a metre-gauge railway. The proposed continuation of the Damascus-Hauran railway to Mecca is a Turkish project, and is designed for administrative purposes and the conveyance of pilgrims.

714. Cyprus, the island in the angle between Syria and Asia Minor, is tributary to Turkey, but has been under British administration since the treaty of Berlin in 1878. Cultivation is extending, and the export of wine (chiefly for mixing), carob beans, wheat, sesame, and other products is increasing. The vine is principally cultivated round Limassol, on the south coast. Locusts once formed the great plague of the island, but under British direction they have been successfully dealt with. The capital of the island is **Levkosia**, or Nicosia, in the middle of the great plain, the **Mesaoria**, which stretches from west to east throughout the island. An important irrigation work is now in progress here.[1] The chief port is **Larnaca** on the south coast.

715. Mesopotamia. This region is in the south wholly dependent

[1] Of 314,000*l.* advanced to the island under the Colonial Loans Act of 1899, 60,000*l.* has been allotted to irrigation, and the bulk of this sum has been devoted to schemes estimated in all to reclaim 10,000 acres and irrigate 42,000 acres of the Mesaoria.

upon irrigation, and neglect of the works for the purpose—a neglect largely due to the absence of a sufficiently strong government to defend the settled population against the plundering tribes of the desert—has led to an even more striking decline than in Syria and Asia Minor. At various periods of history the banks of the Tigris and Euphrates have been the seats of brilliant civilisations based on agricultural production (716*a*). If only security could be guaranteed, there can be little doubt that the region between the Tigris and the Euphrates might be made once more as prosperous as in the days of the caliphs of Baghdad. In the opinion of Sir William Willcocks, late Director-General of Reservoirs, Egypt, the designer of the Aswan dam, between 4,000 and 5,000 square miles might be reclaimed with great profit between about 34° N. and the site of ancient Babylon in about 32½° N., this area lying mainly west of the Tigris north of Baghdad, and stretching from the Tigris to the Euphrates south of Baghdad, but including also about 650 square miles east of the Tigris to the south of Baghdad.[1] The land so reclaimed would be available not merely for cereals, pulses, clovers, and such winter crops, but also for cotton, sugar-cane, maize, and the other more valuable summer crops of Egypt. No doubt the required security will be in some measure conferred if the projected railway to **Baghdad** (712*a*, 716*a*) is actually constructed. Meanwhile there is no better means of communication than camel caravans and river boats. **Ocean-going steamers ascend to Basra**, or Bussorah (716*c*), on the Shat-el-Arab, **river-steamers to Baghdad on the Tigris**, and smaller boats to the still important town of **Mosul**, opposite the site of the ancient Nineveh. Access to Basra is hindered by a bar at the mouth of the Shat-el-Arab, across which no ship drawing more than sixteen or eighteen feet can pass at high-water. On the **Euphrates, navigation** is much obstructed by mills and other hindrances. Formerly Birejik, in about lat. 37°, was considered the upper limit; now the river is not considered navigable above Rakka to the south of 36°, and it is not actually navigated beyond **Hit**, in about 33½° N. Foreign vessels are not allowed on the Euphrates at all, nor on the Tigris above Baghdad.

716. **ARABIA** is made up **mainly** of **desert tablelands** upwards of 3,000 feet in height. The coast is everywhere bordered by a strip of flat country, generally arid and fiercely hot, and the only parts that have even a fair supply of rain are the mountainous tracts in the south-west (**Yemen**) and the south-east (**Oman**). **Yemen**, the Arabia Felix of the ancients, has mountains rising to upwards of 10,000 feet in

[1] Willcocks, *The Restoration of the Ancient Irrigation Works on the Tigris* (Cairo, 1903), pp. 16–18. With regard to the exaggerated estimates given in the previous editions of my *Commercial Geography*, I must explain that I was one of those misled by the statements in Dr. A. Sprenger's *Babylonien*, the errors in which have been exposed by Dr. H. Wagner. The total area once irrigated in Babylonia is estimated by Dr. Wagner at 7,700 to 9,650 square miles. (See *Petermanns Mitteil.*, 1902, 'Litteraturbericht,' p. 198.)

height, and has an ideal climate for coffee-culture (280). Even under Turkish rule the terrace cultivation of the mountain sides is admirable (64). The **oases in the interior** are the home of the Arab race in its purity, the typical region of the fleet desert horse, the camel, and the date-palm. **Politically, Arabia is divided.** The peninsula of Sinai belongs to Egypt, the remainder of the west coast to Turkey, and to the same power belongs a strip called El Haza, on the Persian Gulf, extending to the bay situated to the south of the Bahrein Islands. The remainder of the east coast belongs to the most powerful native ruler, the Sultan of Oman. **Aden**, on the south coast, about 120 miles from the Strait of Babelmandeb, has belonged to the British since 1839,[1] and is annexed to the Presidency of Bombay (British India). Possessing an **admirable natural harbour**, it has at different periods been a great *entrepôt* in the trade between Asia, Africa, and Europe, and since the opening of the Suez Canal its importance in this respect has greatly increased. The site it occupies is nevertheless so sterile that all provisions and firewood have to be imported, and water is largely derived from the condensation of steam from sea-water. In **Yemen** the most important town is **Sana**, which lies at the height of about 7,500 feet in the interior; and the **port of Hodeida**, in direct communication with this town, is the busiest seaport on the Red Sea. The port of Mokha, further south, gives name to the coffee of Yemen. In the Turkish province of **Hejaz** the chief town is **Mecca**, to which, as well as to its port, **Jedda**, the Mohammedan pilgrimages (120) give a great deal of mercantile importance. The Sultan of **Oman**—or, as he is known from his capital, the Sultan of **Maskat** (Muscat)—is pledged by a treaty with the British, concluded in 1892, not to cede any part of his territory without British consent. Since the early part of the nineteenth century both sides of the Persian Gulf have been policed by the British fleet, and a British company has laid the only buoys which mark practicable channels and safe anchorages.

In El Haza the small territory round the inlet of **Koweit**, or Koait, which forms an excellent natural harbour, is subject to an Arab sheikh, who owns a merely nominal allegiance to Turkey. This harbour, also known as Grane or Korein, has frequently attracted attention as the proposed terminus of several projected railways from the Mediterranean to the Persian Gulf, previous to the Baghdad railway (712*a*).

716*a*. The whole of the area embraced by paragraphs 711–718 is of extreme interest in the history of commerce. The Red Sea and the Persian Gulf formed from the remotest period of history avenues through which the spices and other valuable products of the east were brought to the Mediterranean, in both cases through regions occupied by the oldest known civilisations of the world. The Red Sea route brought the east into communication first with the Nile valley (804*a*),

[1] Attempts on Aden were made by the Portuguese in the early days of their eastern trade, first in 1506, but they were not successful.

the Persian Gulf route to the Tigris and Euphrates and the civilised peoples established on their banks. All these civilisations depended on irrigation; but the extent of the irrigation in the Tigris and Euphrates valleys, though favoured more or less by natural conditions, depends very greatly on the maintenance of irrigation works such as can only be carried out and preserved by highly advanced communities, and hence has varied greatly at different periods of history. There are three areas in these two valleys where the natural conditions, when properly utilised, have favoured the concentration of population and wealth. One of these is on the right bank of the Tigris north of 36° N., where the waters brought down from the mountains of Kurdistan were in ancient times spread out so as to irrigate the core of the ancient empire of Assyria round the extensive city of *Nineveh*. Since the fall of Assyria there has been only a feeble irrigation system in and round Mosul, on the opposite bank of the river. Lower down, where the rivers Euphrates and Tigris approach one another, the slope of the ground is such as to lead canals running eastwards and slightly southwards from about 33½° N. on the Euphrates to about 32¼° N. on the Tigris, and then, still lower, the slope becomes more southerly, so as to lead the water back towards the Euphrates. At a very remote date the whole of this narrow tract between the two rivers appears to have been irrigated by a network of canals converging at *Babylon* on the Euphrates, and making that city the capital of one of the most renowned empires of antiquity. The final decay of this city appears to have been largely due to the withdrawal of a great part of the water-supply of the neighbourhood in order to support the cities that grew up at the ends of the great canals running from the Tigris to the Euphrates north of 33°. In that district, about the meeting-place of these canals, there have again and again been important and wealthy cities, which derived further advantage from the fact that the Diala formed a waterway leading up to one of the chief entrances into western Persia (718). In ancient times *Seleucia*, some little distance below the modern Baghdad, on the right bank of the Tigris, was, from about 300 B.C., the capital of the Greek kingdom of Syria, and afterwards, till its destruction by Severus in 198 A.D., an important city of the Roman province of Syria. After this event its Parthian rival *Ctesiphon*, on the opposite bank of the Tigris, flourished, first under Parthian and then under Persian rule, till it was destroyed by the Arabs in 635 A.D. More than a hundred years now passed without an important city in this district, but at last, in 762, Baghdad was founded a little to the north of the ruined cities of Seleucia and Ctesiphon, and by the time of the celebrated Caliph Harun-al-Rashid, so well known from the 'Arabian Nights'—that is, in the early part of the ninth century—the whole district round had been revivified by the restoration of the irrigation works, and Baghdad remained for centuries one of the most magnificent cities of the east in the heart of one of its most

productive agricultural regions.[1] The main irrigation canal on the east side of the Tigris, nearly 400 feet wide, was one with which no Egyptian or Indian canal of the present day can compare in magnitude.[2] A careful examination of the plans and levels of this district has led Sir William Willcocks to the conclusion that the ruin of this magnificent irrigation system must have been due to a sudden change in the course of the Tigris, which then seems to have eaten away a portion of this canal, the water in which has now a width of only from 16 to 30 feet.[3] Even after the destruction of this eastern canal there still remained a great canal running from the Euphrates to the Tigris at Baghdad, and serving for navigation as well as irrigation. As late as the latter part of the sixteenth century this was the regular waterway from the upper Euphrates to the Persian Gulf. It was by this route that at that time (1583) the first English commercial expedition proceeded to India.

716*b*. At all periods when there has been an important civilisation in any part of the plains bordering the Tigris and Euphrates there have been important trade-routes passing thence to the northern part of the Syrian seaboard. It was this seaboard which at a very remote period of antiquity was occupied by the Phœnicians, a people who, according to their own traditions, confirmed by the evidence of remains of various kinds, originally came from some district bordering on the Persian Gulf. Numerous remains on the Bahrein Islands[4] show that, if that was not their original home, they must at one time have been settled there. The names of two of the Bahrein islands, *Tyrus* and *Aradus*, were repeated on the Phœnician coast. If they came from the Persian Gulf they no doubt retained the tradition of the way thither. In any case the wealthy empires on the Tigris and Euphrates formed the most valuable part of the hinderland of that seaboard. From Nineveh the trade-route would pass by way of the modern Aleppo and descend on one of the northern ports such as Aradus (now Ruad) or Tripoli. From Babylon the route necessarily first ascended the valley of the Euphrates. The untraversable desert on the west inevitably barred direct connection with the sea. But having reached a point on the Euphrates somewhat north of 35°, traders could make use of a long furrow with water-holes leading south-westward to Damascus.[5] Now it is to be noted that Damascus can be conveniently reached from Sidon and still more conveniently from Tyre without crossing either

[1] See the translation of a description of Mesopotamia and Baghdad written about 900 A.D., with annotations by Guy Le Strange, in the *Jour. Roy. Asiat. Soc.*, 1895, with map (p. 38).

[2] Sir Wm. Willcocks, *The Restoration of the Ancient Irrigation Works of the Tigris* (Cairo, 1903), p. 12.

[3] *Ibid.* p. 14.

[4] See a paper by the late Mr. Bent in *Proc. R.G.S.*, 1890, p. 1.

[5] On this route the longest stretch on which Baron v. Oppenheim in 1893 found no water was sixty miles. See *Petermanns Mitteil.*, 1896, p. 57 (comparing map).

Lebanon or Anti-Lebanon, and there can be no doubt that special importance was conferred on these two ports, at both of which local conditions favoured the construction of harbours suited to the small ships of the time, by their relation to that ever-flourishing oasis. That oasis must have been the cause of bringing a large proportion of the commerce between the Mediterranean and the Euphrates valley by the route above referred to, and hence of giving a special stimulus to the textile, metal, glass and other industries to which commerce gave rise on the Phœnician seaboard.[1] For thousands of years the towns on the Phœnician seaboard had the advantage of lying between the highly-developed civilisations of Mesopotamia, on the one hand, and the Mediterranean on the other hand, the Mediterranean including the equally ancient and brilliant civilisation of Egypt together with a multitude of coasts and maritime valleys supplying in abundance food and raw materials. Tyre was destroyed in 332 B.C. by Alexander the Great, and the whole Phœnician seaboard then fell under Greek rule. But that did not put an end to the importance of this coast. Tyre flourished again in Roman times, though Beirut (*Berytus*), which is the port of the most extensive strip of fertile coast in Phœnicia, had already become an important rival. Once more it flourished in the middle ages, especially during the period (twelfth and thirteenth centuries) when the crusades gave Venetian and other Christian merchants greater security on this seaboard. At this time, however, Aleppo in the north had as powerful an influence on trade-routes to the Euphrates as Damascus in the south, and hence the northern ports were also much frequented. **Latakieh** or **Latakia** was the favourite port for that centre till its commodious harbour was destroyed by an earthquake in 1188. Its place was then taken by **Alexandretta**, but even **Tripoli**, far to the south as it lies, was also frequently made use of by merchants on their way to Aleppo. Even the discovery of the sea-way to India did not altogether put an end to the distant trade that passed through this seaboard. The Portuguese, who discovered that route (100), took from the Arabs the island of **Ormuz** at the mouth of the Persian Gulf (1515), and retaining it for upwards of a hundred years still preserved a great deal of the trade that it had long possessed, in virtue of its situation at a point whence a great trade-route passed northwards into Persia and north-westwards to Mesopotamia and the Mediterranean. The great trade of the place is described by Ralph Fitch, the chronicler of the first English expedition to India in 1583. The island lost its importance when it was taken by the Persians, aided by the English, in 1622, but the memory of its former glory lived long enough for it to be taken by Milton as a symbol of oriental wealth and splendour.

[1] On the geographical foundations of Phœnician commerce and industry see Élisée Reclus, *La Phénicie et les Phéniciens*, in *Bull. de la Soc. Neuchâteloise de Géog.*, vol. xii. (1900).

716*c*. It can hardly be considered surprising that the Arabs, the people occupying the vast peninsula between the two avenues leading from the Mediterranean to the east, should have been great traders from the earliest times down to the present day. The valley of Hadramut in the south of Arabia was the principal source of frankincense, one of the oldest and most valuable articles of commerce. Arab ships at an early date brought spices from India and gold from South Africa. The Zimbabye ruins in the east of the Transvaal have been proved to be of Arab origin, and it is most likely that they date from before the beginning of the Christian era. They had equal experience in caravan traffic by land, a natural result of the character of their country. Another result of this latter circumstance was their knowledge of the value of running water and the skill in irrigation which they developed at an early date. At Marib, in Yemen, some eighty miles north-east of Sana, there are remains of a huge irrigation dam two miles long and about 120 feet high, believed to have been originally built about 1700 B.C. When, after the death of Mohammed in 632 A.D., the Arabs, acting under a strong religious impulse, spread east and west from the centre of their faith, their skill in irrigation and commerce greatly assisted them in founding the brilliant Arab civilisations that grew up at various centres. It should be noted that the area which their conquests ultimately embraced, extending from the Spanish peninsula through north Africa to the valley of the Indus, was almost confined to countries in which irrigation was a matter of the first importance. In Spain they maintained themselves longest in the region in which irrigation was most valuable. In north Africa at Kairwan they established a brilliant capital on a site where none but Arabs would have thought of doing so. In Egypt and in Syria they acquired the succession to the irrigation systems of the Nile valley and Damascus. In Mesopotamia, we have already seen, they renewed the old irrigation works about the confluence of the Tigris and Diala. On old caravan-routes between the Indus valley and Mesopotamia there are numerous remains of undoubted irrigation works of Arab origin. In the west commerce was carried on by them for the most part chiefly by land-routes. In the earlier centuries of their expansion they did indeed make important conquests (Sicily, Crete) in the Mediterranean, but there Christian powers in the end outstript them at sea, and an Arab historian tells us that the rise of Tunis, situated at the head of an easily defended inlet, at the expense of Carthage in the early part of the eighth century was largely due to the fear of attacks from Europe to which Carthage in its more exposed situation was open.[1] In the Indian Ocean, however, Arab sailors were very adventurous. Immediately after their conquest of Syria and Persia, in 635 or 636 A.D., they founded on the Shat-el-Arab the port of Basra,

[1] Dr. Brown's edition of *The History and Description of Africa*, by Leo Africanus, iii. p. 716.

which then became the intermediary between Mesopotamia and the east, and grew in importance after Baghdad had arisen and begun to flourish on the Tigris. In the centuries immediately preceding the Arab conquests, Chinese ships had frequented the Persian Gulf and even ascended the Euphrates. From the Chinese the Arabs learnt the use of the mariner's compass, and with its aid made bold voyages right across the Indian Ocean and the China Seas.[1] They ultimately had regular trade relations for a time even with Khanpu on the Gulf of Hangchow, and a report from an Arab traveller of as early a date as 851 has come down to us showing a wonderful amount of knowledge even of the remote interior of China.

717. **PERSIA**, like Arabia, is largely made up of tablelands more than 3,500 feet in height, and in the east these are in a large measure desert. In the west a large part is above 5,000 feet. In the east, on the other hand, it sinks in the district of **Sistán** or Seistan, in which the Helmand ends, to an altitude below 2,000 feet. Mountains in the west and north promote a larger rainfall, which, even where insufficient by itself for cultivation, as it mostly is, at least feeds numerous streams that can be used for **irrigation**, or supplies moisture which can be drawn from the heart of the mountains by **tunnelled canals** (kanats or karizes). Sistán, the eastern half of which belongs to Afghanistan, is imperfectly irrigated by water drawn from the Helmand. Formerly this district was much more productive, but it has lain waste to a large extent since Timur (Tamerlane) in the latter part of the fourteenth century destroyed a great irrigation dam across that river. There can be little doubt, however, that its productiveness might be restored by strong and honest government. Through the misgovernment of despotic rulers, however, production and commerce in Persia generally are in a very backward condition.

718. The **means of communication** are very imperfect, but have been improved in certain places within the last few years. From whatever direction the interior is reached from the sea a difficult ascent has to be made through the mountains bordering the Iranian tableland, and the only approach on which that access is facilitated by rail is that from the Indus plains to Quetta (722), which is separated from Persia by hundreds of miles of arid steppes. The road inwards from **Bushire** (see map) is an extremely difficult mule-caravan road, and seems likely to be to a large extent abandoned in favour of the route described in the next paragraph. From the capital, **TEHERAN** or **Tehran**, situated at the base of the Elburz Mountains, runs the only railway as yet (1908) existing in Persia (opened in 1888). Even from Teheran to **TABRIZ**, the chief city in the north-west, goods have still to be carried the greater part of the way on pack animals. A carriage-

[1] See the map accompanying a paper by Col. Yule in *Proc. R.G.S.*, 1882, p. 651.

road has since 1879 led in that direction as far as **Kasvin**, and since 1899 a road constructed by a Russian company has led thence down to **Resht** on the Caspian littoral behind the port of **Enzelli**. Since 1892 another carriage-road has led from **Meshed**, the chief town in the north-east (Khorassan), a great resort of pilgrims, to the Persian frontier, where it joins the road from the Trans-Caspian town of Ashkabad. Another road leads south from Teheran to Kum, but with these exceptions Persian roads are not capable of being continuously used by wheeled vehicles, although this is possible during dry weather in the plains. From Baghdad the traffic still ascends to **Kirmanshah** and **Hamadan** through the **Holwan** (or, as it was called in ancient times, the *Zagros*) defile with the same difficulty as had to be encountered in ascending from the cities of the Mesopotamian plain in ancient times. An equally difficult route leads from Bandar (or Bender) Abbas, opposite the formerly celebrated island of Ormuz (716*b*), to Kirman. Under an agreement with Russia no new railways are to be constructed in Persia before 1905.

719. The only navigable river in Persia is the **Karun**, which belongs to the Mesopotamian plains, its mouth being connected by a side-arm with the Shat-el-Arab. Its navigation as high as **Ahwaz** or Ahvaz, where rapids occur, was thrown open to foreign vessels in 1888. At that time the construction of a carriage road leading by Shushter, Dizful and Sultanabad, and ultimately joining the Kum road from Teheran was contemplated, but it has not been carried out. A mule-caravan road has, however, been made from Ahwaz through the Bakhtiari country to Ispahan, and though it repeatedly goes up and down as much as 2,000 feet and ultimately rises to an altitude of 7,800 feet, it is nevertheless easier than that from Bushire and only about half the length (277 miles as against 580). This route is therefore likely more and more to attract the trade from Bushire, especially since **Mohammera**, the seaport on this route, situated on the arm connecting the Karun with the Shat-el-Arab, is a commodious port at which vessels of large draught can approach close to the bank, while Bushire has only an open roadstead.

720. By such routes few articles except such as are of relatively high value in proportion to their bulk can be conveyed. The chief **exports** are pearls (derived of course from the Gulf), opium, raw silk (from the Caspian littoral, which in former days was famous for this product), carpets, gums (including gum tragacanth), various drugs and dyes, coral (chiefly from Khorassan), turquoises (from Nishapur), horses, for which Persia has been famous for centuries, &c. The principal **imports** are cottons, sugar, tea, pearls, wheat and flour. Of late years Russian trade has been growing in northern Persia (the most populous part of the country) at the expense of British. This has been due to various causes, of which the chief are the shorter distance from the Caspian ports and from Ashkabad to the interior,

the construction of the Resht and Ashkabad roads, and the special encouragement given by the Russian government—chiefly in the form of bounties on goods exported to Persia and reduced railway rates on Russian goods destined for Persia. A new Persian tariff which came into force early in 1903 in some particulars favours Russian at the expense of British and Indian goods.

721. **AFGHANISTAN** resembles Persia in surface, climate, and products, and is, like it, cultivated where irrigation can be practised, in the neighbourhood of the mountains; barren or nearly barren elsewhere. The richest valleys are in the north—those of the Kabul River and the Heri Rud. On the former river stands **Kabul**, the capital, which has been connected with Pesháwar by a carriage-road through the **Khaibar Pass** since the temporary occupation of the town by the British in 1879. On the Heri Rud stands **Herat**, the centre of a well-irrigated and fertile valley, about 120 miles in length by about twelve miles in width. Besides the road above-mentioned there are no roads for wheeled carriages, and goods are carried on beasts of burden, chiefly camels, through close and craggy defiles and narrow stony valleys, among bare mountains, or over waste plains. Formerly traders on this route had constantly to defend themselves against robbers, but in the vicinity of the British frontier more peaceful and secure methods of carrying on trade have been established. A British escort accompanies the traders through the mountains to the Afghan frontier, and there hands over the caravan to an escort of Afghans. The **trade with India**, however, is very limited in consequence of the restrictions imposed by the amir. At one time there was a considerable trade through Afghanistan between India and central Asia. It passed to a large extent across the **Bamian Pass** (12,000 feet), between the Hindu Kush Range and the Koh-i-baba west of Kabul, a route which at various dates in the middle ages was much used for valuable commodities. But such through trade has been entirely stopped, partly by the heavy transit duties imposed by the amir, and partly by the customs duties levied on the Russian frontier. The small trade that India still carries on with Afghanistan consists chiefly in the import of wool and dried fruits in exchange for cottons, tea and sugar.

722. **BALUCHISTAN** is composed mainly of arid and unproductive tablelands inhabited by sparsely scattered tribes. Its government is now under British control, and a tract in the north-east composed of the districts of Pishin and Sibi, and containing the fortress of **Quetta** (5,500 feet), forms part of British India. This place is now connected with Sind by a railway with one loop running eastwards up the Nari pass, and another (with gradients of 1 in 24) up the Bolan pass. The idea of opening a trade-route from Quetta through northern Baluchistan with Sistán and Meshed in Khorassan, a distance of more than 1,000 miles, has long been entertained. A caravan-route was at last

established about 1898, but the trade by that route, though it has grown rapidly, is still insignificant.[1] The Indian government has, however, sanctioned the construction of a railway on the first part of the route, from Quetta to Nushki, between which places there are three hill ranges to cross, with a final sharp drop of 2,000 feet in altitude.

[1] In 1908–09 its total value in both directions was still under 100,000*l.*

THE MONSOON COUNTRIES AND THEIR DEPENDENCIES

723. INDIA. There is no part of the world better **marked off by nature** as a region by itself than India, exclusive of Burma. It is a region, indeed, full of contrast in physical features and in climate, and one that has never been, strictly speaking, under one rule; but the features that divide it as a whole from surrounding regions are too clear to be overlooked. **On the north** it is bounded by the **Himalayas**, the loftiest mountains in the world; **on the west**, as we have already seen, it is bounded by mountains and deserts; and **on the east and north-east** it is not only bounded by mountains, but lofty mountain chains and deep valleys follow one another for hundreds of miles. Elsewhere the boundary is the sea.

724. Within the mountains **a vast plain**, from about 150 to more than 300 miles in width, sweeps round from **the delta of the Ganges and Brahmaputra in the east to that of the Indus in the west.** The **peninsular portion** to the south of these plains is mainly made up of **tablelands** varying in elevation for the most part from about 1,500 to 2,500 feet. On the west this tableland advances close up to the sea, and is bounded by the mountains called the **Western Ghâts**; but on the east its boundary is generally at a greater distance from the coast and is more winding. The name of **Eastern Ghâts** is sometimes used generally for the whole of this boundary, sometimes restricted to its southern portion.

The **dense population** is for the most part confined to the plains, but is prevented by climatic and other circumstances from extending over their whole area.

725. In the plains **communication** is naturally easy. The scarcity of stone in the great plains of the north has been an obstacle to the making of good metalled roads, but the rivers of the Ganges basin mostly furnish good **waterways**, and the flatness of the surface has greatly facilitated the construction of **railways**.[1] Of these there is now a tolerably dense network in the middle of the Ganges basin, where they have almost superseded water carriage, except in the case of heavy goods. In the delta of the Ganges and Brahmaputra, which

[1] The map on p. 384 shows that these railways are on two different gauges. There are also a number of mountain railways on narrower gauges (2 feet and less).

furnishes an unsurpassed system of water communications, the network of railways is not so close, and the **Brahmaputra still forms the main highway to the north-east.** A line of steamers regularly plies up and down it as far as Dibrugarh, about fifty miles below the angle made by this river on entering Assam. The **Indus,** owing to frequent shiftings of its bed and accumulations of sand, is **not so easy to navigate,** and steamer traffic on it has now been abandoned.

726. In the peninsular portion of India the nature of the surface has placed **special difficulties** in the way of communication between the coast and some of the richer plains or depressions of the tableland in the interior. The rivers in times of flood are too impetuous, at other seasons most of them are too scantily supplied with water, to be navigable except near their mouths, and even where they are navigable higher up their navigation is impeded by rapids occurring where they break through the mountains bordering the plateau. Not only so, but they mostly break through these mountains in gorges too narrow or country too wild to be easily traversed by roads or railways. On looking at a physical map of India one might expect the **valley of the Narbadá,** continued by that of the Son, a tributary of the Ganges, to form a natural line of communication between the Gulf of Cambay and the valley of the Ganges; but this is prevented by the existence of rugged forest country on the lower part of the Narbadá, and a region so wild in the upper two-thirds of the valley of the Son that it is still imperfectly explored. Hence the railway that now passes through **the most fertile expanse of the valley of the Narbadá, between the Vindhya Hills on the north and the Sátpura Hills on the south,** enters this valley by a diagonal route from Bombay, and leaves it near the head of the valley of the Son, then striking north-eastward to Allahabad, at the junction of the Ganges and Jumna.

727. So, too, a series of fertile depressions of the tableland is cut off from the coast by wild and difficult country on the lower part of the **Tápti,** and this region is hence reached by a branch of the same railway that proceeds from Bombay to the valley of the Narbadá. To gain the surface of the tableland, this railway has to cross a pass called the **Thál Ghát,** more than 1,900 feet in height; and communication between Bombay and Madras, across the **Deccan,** as the southern part of the tableland is called, is now (since 1868) effected by means of a railway up the **Bhor Ghát,** a pass about a hundred feet higher than the former and much more difficult. The carriage-road up this pass, completed in 1830, itself a remarkable engineering achievement, formed the first good means of communication between Bombay and the interior.

728. A third railway now crosses the Western Gháts about the middle, serving to connect the Portuguese port of **Goa** with the fertile district of **Dhárwár,** and through that with Madras; but south of this there is no other railway across the peninsula till we come to the remarkable depression known as the **Pálghát Gap.** This important

physical feature lies immediately to the **south of the Nílgiri Hills**, a group of small but high plateaux in the south of the Deccan, at the angle where the Western and Eastern Gháts approach nearest to one another. The highest elevation of the gap is little more than 1,000 feet above the sea, and the opening which it forms is all the more striking from the fact that it separates mountains rising to nearly 9,000 feet in height both on the north and south. The southern mountains extend to the southern extremity of the peninsula, occupying the greater part of the native states of Cochin and Travancore. Through the gap between them and the Deccan runs the railway from Madras to Calicut. (See the map opposite p. 380.)

729. As regards **climate**, the Indian year is divided into **three seasons**—the hot, the rainy, and the cool; but these names are appropriate only in the north-east and to some extent along the western coast. In the south, where the latitudes are low, there is no really cool season, and in the north-west, though the rains occur at the same period as in the Ganges valley they are small in amount. The **hot season** is from **March to May** inclusive, the period that embraces the change of the monsoons from north-east to south-west, but before the 'bursting' of the south-west monsoon—that is, before the southerly winds begin to be accompanied by rain. During this period the highest temperature is in the heart of the Deccan. The **rainy season** lasts from **June to October** inclusive, and during this period the western slopes of the Western Gháts, the hills of Assam, and in the east of the Himalayas, and even the plains of the Ganges delta, are deluged with rain, and the greater part of the north-east receives a fairly abundant rainfall. The part of the Deccan immediately behind the Western Gháts, however, has a very moderate and precarious rainfall, and so too have the plains in the north-west. A large part of the Indus valley is almost rainless. Where the rains are abundant the temperature is mitigated, but in the arid region just referred to this is naturally the hottest period of the year. The **cool season**, or the season of the north-east monsoon, lasts from **November to February** inclusive. This is the rainy season for the south-eastern plains, the moisture carried by the winds blowing across the Bay of Bengal being condensed in consequence of the obstruction presented by the Eastern Gháts and the mountains of Travancore. But the amount of rain that falls on those plains is only one-third or one-fourth of that which falls on the best-watered plains in the north during the rainy season. This season is naturally coolest in the north-west, where the highest latitudes are reached, and even on the plains there are genuine winter temperatures by comparison with the extreme heat of summer. In this region, in the latter half of the cool season (January to about March) there is a recurrence of rains.

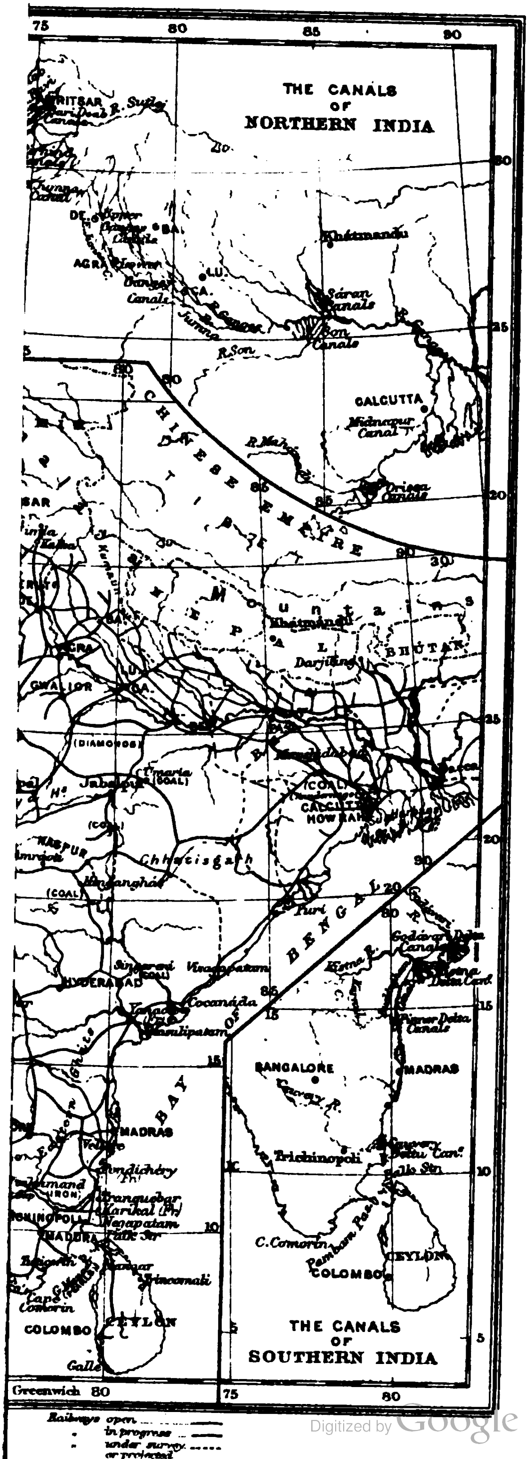
730. The amount of rain that falls varies in India, as everywhere else, from year to year; but it is an important fact that, whereas in a

country like England the variations in the rainfall may increase or diminish the abundance of a crop, in a large part of India the variation may be such that in one year there is an ample supply for a good crop, in another a rainfall wholly inadequate to produce any crop at all. It is this area of uncertain rainfall that is liable to be visited by famines, and hence irrigation has to be practised not only in those parts of the country in which there is always a deficiency of rain, but also in those in which it is doubtful whether the rain may be sufficient or not. Even where the amount of the rain is sufficient for the requirements of the crops irrigation is in many cases demanded by the mode in which the rain falls. The north-east monsoon, on which the southern plains (Madras) chiefly depend for rain, is remarkable for the fact that rain falls for the most part in bursts, and generally at night. 'I have known,' says Sir Arthur Cotton, 'a fall of ten inches in one night, and a fortnight after twelve in another'—half a year's supply in two showers. Accordingly Madras and the Deccan generally are dotted with thousands of tanks or reservoirs for irrigation-water, except in those portions, chiefly lying in the north-west of the Deccan, which are covered with the black soil described in par. 247.

731. These tanks usually contain little, if any, more than one year's supply, and hence are altogether inadequate to meet the uncertainties arising from recurring years of drought. In certain places, however, there is a natural storage of water underground that can always be made available by means of moderately deep wells. The whole of the plain along the base of the Himalayas has constant supplies of fresh water at a greater or less depth, and the middle portion of it has these supplies near enough to the surface to be easily reached. 'Hence, between Delhi and Benares, the upper stratum of the alluvial plain is riddled like a sieve with water-holes or wells ten to fifty feet in depth.'[1] A successful artesian boring has been made at Patiála, a native state of the Punjab plains.

732. The greatest irrigation works are canals led from rivers. In the Indus valley some canals for irrigation are merely laid so as to carry off the surplus water, when the melting of Himalayan snows causes a rise of the water in the main stream and its tributaries. These are known as inundation canals and have been long in operation, and though very useful and profitable in most years the supply of water by this method is precarious, as the rise of the rivers may be so small as to yield little water or none at all. But works of much greater magnitude have been made in the form of canals, into which is led nearly the whole body of water belonging to a river for a greater or less distance. These are known as perennial canals. On the delta of the Cauvery such canals are said to have been constructed as far back as the fourth century of the Christian era, but under British rule such works have been extended to all the other

[1] *Statistical Atlas of India.*



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deltas of the east coast and parts of the plains of northern India.[1] It will be noticed on the map opposite p. 380 that there are no irrigation canals on the lower Ganges, where they are not required (729); none on the area between the Ganges and the Gogra, for the reason stated in the previous paragraph; and few on the upper parts of the rivers of the Deccan, where the depth of the river valleys below the surrounding country (726) does not generally admit of this mode of irrigation.

These canals serve also for navigation. The **Buckingham Canal** is a salt-water canal forming **an inland waterway** from the mouth of the Godávari to Madras, and about fifty miles further south.

733. As might be inferred from the table of exports on p. 610, **India is almost exclusively an agricultural country.** At the census of 1881 the number of persons directly supported by agriculture and the rearing of live-stock made up 72[2] per cent. of the male inhabitants engaged in some specified occupation. The holdings are mostly small, on an average about five acres each. In Bengal the Famine Commissioners in 1880 reported that two-thirds of the peasant holdings were only about half that size. The land furnishes the chief source of the revenue of British India. The land-tax is the first liability on the land. In some provinces it is generally paid by the actual cultivators (the *rdyats*), who are small proprietors; in other cases, by larger landowners from whom the cultivators rent their holdings.

734. For the most part **two crops** are reaped in the year, but not usually from the same land. In the area of the summer monsoon rains, one crop is generally sown in the early weeks of the monsoon (June and July), and reaped in October and November; the other is sown at the end of the monsoon and reaped from January to March. The latter, accordingly, is the winter crop; and as the winter throughout the north-western half of India is at least as cool as the summer of northern Europe, **wheat, barley, and linseed** are among the **winter crops** of the region wherever the duration of cool weather is long enough to ripen them. A line drawn from the Tápti to the upper waters of the Mahánadi may be held to mark approximately the southern limit of **wheat cultivation.** The chief region of production of this cereal is in the **Punjab** and the **North-West Provinces**—that is, far in the north.

735. Although wheat is in some years a valuable export crop, it cannot be considered one of the characteristic crops of Indian agriculture.

[1] About 1885 the total length of canals under government supervision was above 28,000 miles, and the area irrigated by them was equal to that of Belgium. In 1900–01 the length of irrigation canals had been increased to 42,700 miles, and the area irrigated to about 20,500 square miles. The most important irrigation work opened since the last edition of this work is the Chenab Canal in the Punjab, which was in use for the first time in 1892–93, when it irrigated an area of 157,197 acres. In 1908–09 the area irrigated exceeded 1,990,000 acres, and the return on the capital outlay was in that year 22·6 per cent., the return having steadily increased year by year. Meantime colonies of settlers had been established on what had previously been unpeopled crown wastes.

[2] In 1891, 61 per cent.; in 1901, 65 per cent.

The crops that may be described as universal in India are millets, pulses, and oil seeds; and except on the best-watered plains, suitable for rice-growing, and in parts of northern India where a stronger grain is required, millets and pulses, along with garden produce, form the bulk of the food of the agricultural population. The most extensively grown unirrigated crop in India is the great millet (299), here known as *joár*; the millet next in importance is the smaller spiked millet, or *bajra*; and the principal pulse is, as in Spain, the chick-pea or *gram*. In all, fourteen cereals are cultivated, and nine different kinds of pulse. The oil seeds most extensively grown are sesame, linseed, castor-oil, mustard, and different kinds of rape. The largest export under this head is that of linseed (328).

736. The chief places of production of the other exports named on p. 592 are indicated generally on the accompanying map, but in some cases more precise information may be of interest. **Opium (268)** cultivation has its chief seats in the valley of the Ganges round Patna and Benares; and in Central India, in the region corresponding to the old kingdom of Malwa. **Cotton (246–48)** is mainly grown on the southern tableland, and above all in that series of fertile plains opened up by the railway that ascends the Tápti valley—that is, the plains of Khándesh in Bombay, and of northern Berár, both lying on both sides of the Tápti, and those of the Wardhá in the west of the Central Provinces. It is likewise largely grown on many other parts of the tableland—wherever, indeed, there is found the black soil referred to in previous paragraphs, **247, 730.** Regarding rice, jute, indigo, and tea cultivation and export, nothing need be added to what is stated in pars. **294–98, 315, 344, 273–75**; and among the vegetable and animal products not mentioned in the table, reference may also be made to coffee, cinchona, silk, pepper, and lac, all of which are likewise treated of separately (**288, 312, 225, 339, 362**). The import tables show that India is largely dependent on other countries for supplies of **sugar.** Sugar-cane is, however, largely cultivated in the northern plains, and sugar is also derived from palms, chiefly in southern India, and the native production is equal to at least 95 per cent. of the total consumption.[1] With respect to the export of hides and skins, it should be explained that **cattle are the chief beasts of draught and burden** in the greater part of India, but that in the wet plains of eastern Bengal they give place to buffaloes. The great **cattle-rearing region** of India is a belt extending from Cutch, through eastern Rájputána and the Punjab, to Kashmír, a belt in which the rainfall is not so excessive as to wash away all the saline

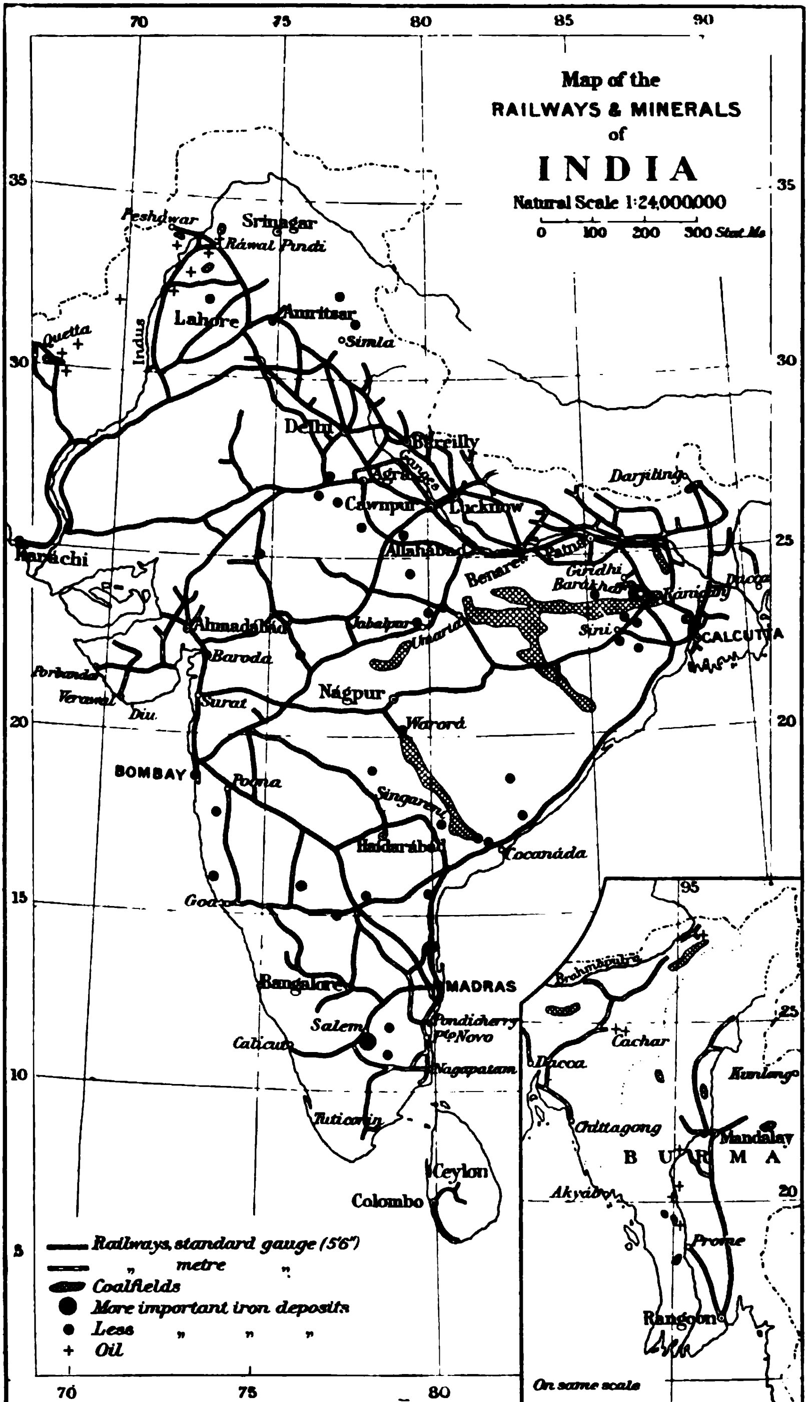
[1] Under a law passed in 1898–99 countervailing duties were imposed on bounty-fed sugar. This was followed in 1899–1900 by a great decline in the total amount imported, especially in the imports from Germany and Austria-Hungary, but in the two following years the total imports were larger than ever, and in 1901–02 the Austrian supply greatly exceeded that from Mauritius, which usually furnishes the greatest quantity. In later years Java has furnished the largest supply.

constituents which are found to be so essential to the health of cattle.

737. The **mineral wealth** of India is tolerably abundant. As shown in the map on p. 384, both coal and iron ore are widely distributed, but of the **coalfields** the most extensive, in the west of Bengal and the east of Central India, lie mostly in a region imperfectly explored and not easily accessible, and the bulk of Indian coal is able to do only from one-half to two-thirds of the work of imported English coal. The most productive parts of the chief coalfield lie in the Damodar valley belonging to the basin of the Húglí, where about four-fifths of the coal raised in India is produced. **Rániganj**, about 120 miles northwest of Calcutta, was long the principal coal-mining centre, but the production of this field has at last been eclipsed by that of the Jherria field, about 40 or 50 miles further west. On the tableland three important coalfields are now connected with the Indian railway system. One is that at **Umaría**, east of Jabalpur; another, that of **Warorá**, in the Wardhá valley; and the third that of **Singareni**, in Haidarábád. Another coalfield in the east of Assam is connected by rail with Dibrugarh (725). (See also 376.)

737*a*. **Iron ore** is widely scattered over the mountainous and hilly parts of the country, and with the profuse employment of charcoal for smelting the natives make ore of excellent quality. But this expensive mode of working has, in the districts most accessible to foreign commerce, been almost superseded by the import of European iron and iron wares. Attempts have been made to introduce the modern processes of smelting in India, but so far they have usually met with little success. The most successful have been the works at **Barákhar** in the north of the Rániganj coalfield, where ores are obtainable, and a suitable coal for smelting is procured at Karharbári or Giridhi.[1] The chief obstacles in the way of success are the difficulty of finding the ore, flux (limestone), and fuel together (388), and the inferiority of native coal for smelting. **Silver**, though till recently the standard metal of the country, is **nowhere** found, but **gold** is mined to a considerable amount. The chief mines are in the **Wainád** district in the Western Gháts near the Nílgiri Hills, and in the east of **Mysore** (Kolár). **Copper** is abundant in the Himalayas from Kumaun to

[1] There two blast furnaces are in operation, and castings, said to be equal to the best British manufacture, are also produced, and the operating company has determined to lay down a steel-manufacturing plant. Two other schemes are now entertained for developing a great iron and steel industry in India. One is for the utilisation of the excellent iron ores that crop out in a ring round the sides of an isolated hill near Salem in southern India. These ores it is proposed to convey to Madras (200 miles) and thence to Calcutta, where they would be smelted with coal brought from Giridhi with the aid of limestone as a flux brought from the eastern side of the Bay of Bengal. The second project seems now to be on the eve of being carried out by a Parsí capitalist. It is to establish iron-works at Sini, a railway junction to the west of Calcutta, utilising local limestone, ore from extensive deposits in the hill state of Morbhanj to the south-east, and coking coal from the vicinity of Giridhi to the north.



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Darjíling, and is likewise found elsewhere. **Salt in India**, as in all vegetarian countries, is a necessary of life more urgently required than in countries in which more animal food is consumed. It is obtained **by evaporation all round the coast**, and also from inland salt lakes in the arid region of the west, and is quarried in the form of rock-salt in the **Salt Hills** in the north of the Punjab. It is also imported (**422**). The duty on it is an important source of revenue to the state. **Manganese** is now an important product in the Central Provinces, near Nágpur in Central India, and near Vizianagram in Madras. The deposits in the Central Provinces began to yield only in 1901, but are now much the most productive. The ores worked are very rich, the low grade ores not paying the cost of working. **Mica** is largely produced in northern Bengal. The extraction of saltpetre (nitrate of potash) from saline deposits in the plains of northern Bengal has declined from various causes, but chiefly in consequence of the fact that it is now more cheaply prepared from Chile saltpetre or nitrate of soda. Though the map shows many places in which **mineral oil** is found, its production is important only in Burma.

738. Not only in metal-working, but also in various other branches of manufacture, the **Indian handicrafts have suffered greatly from European competition**, as the table of imports on p. 586 pretty clearly shows. Cheap Manchester cottons, and more recently the products of the native cotton factories [1] of Bombay (**259***a*), have told heavily on the old hand-spinning and weaving. Even the fine **muslins of Dacca** (Bengal) and Madras, for which India has long been celebrated, have almost become a thing of the past. In the making of various articles of luxury and art, however, Indian artisans still excel. Silk-factories worked by steam have been started at Bombay, but the making of richly **figured silks** by hand is still carried on to a large extent in **Murshídábád** (Bengal), **Benares** (North-West Provinces), **Ahmadábád** (Gujerat), **Trichinopoli** (southern Madras), and other old towns of note. **Cashmere shawls** are still made both in Kashmír and the Punjab (Amritsar, Ludhiána, and elsewhere). Indian carpets and rugs are articles of export, and so also are a variety of articles skilfully wrought in ivory, gold and silver, copper and brass, but the quality of many of these articles has been greatly injured through the want of taste in European purchasers. The cotton and silk factories and the **jute-factories of Bengal (315)** are an illustration of the growth of the modern spirit of commerce in India, which is shown also in the rapid increase in the number of **native joint-stock companies**. It may here be added that in the Bombay factories work can be carried on all the year round without artificial light. (Comp. **486***a*, **647**.)

739. It will be observed from the tables in the Appendix that one

[1] Under the present Indian Factory Act, which came into operation on January 1, 1892, children cannot be employed in factories under the age of nine, and the hours for children between 9 and 14 are limited to seven; for women the hours are limited to eleven per day.

of the striking features of Indian foreign commerce is the **large excess of imports of bullion and specie.** The high proportion to the total value of the imports of other kinds of merchandise which this excess reached in the periods 1860–65 and 1866–70 is easily explained by the large remittances of specie in payment of the cotton imported from India in such large quantity during the American civil war and in the years immediately subsequent; but it is obvious that the continuance of a greater or less excess under this head points to the **steady accumulation of specie (chiefly silver) in the country.** Another noticeable fact is, that even when the excess of the import of treasure is added to the value of the import of merchandise, the Indian **imports are still far below the exports in value.** The explanation of this difference is found in the necessity of exporting, either in treasure or in goods, enough not only to balance the imports, but likewise to pay the home charges of the Indian government, pensions, and the cost of carriage of exports.[1]

740. The foreign **sea-borne commerce** of India proper (exclusive of Burma) is **almost confined to four seaports**—Calcutta, Bombay, Madras, and Karáchi (Kurrachee), and more than 80 per cent. of the whole falls to the share of the first two.

CALCUTTA,[2] on the Húglí, an arm of the delta of the Ganges, is the last of a succession of ports which have flourished on the same stream. The others, all of which stood higher up, have declined in consequence of silting, and the same fate is averted from Calcutta only by great engineering works. Founded in 1686, the town was made

[1] In view of the increasing proportion of the trade of India, especially the export trade, carried on with other countries than the United Kingdom as shown in the tables in the Appendix, some particulars as to the trade as shown in the last trade-returns, coming down to 1908–09, will probably be found of interest. Of the raw jute exported about two-fifths went to the U.K., of the remainder the bulk went to Germany, the U.S., and France. As a market for gunny-bags Australia came first, while the U.S. took nearly 65 per cent. of the gunny cloth. Nearly 14 per cent. of the rice went to Ceylon, about 11 per cent. to the Straits Settlements. The oil-seeds were taken in nearly equal proportions by (1) U.K., (2) France, (3) Germany, Holland and Belgium. Japan was the chief market for raw cotton, taking 30 per cent.; the rest was widely scattered, but the U.K. took less than 6 per cent. Raw hides and skins went mainly to the U.S. and Germany, those dressed and tanned mainly to the U.K. Tea went chiefly to the U.K. (nearly 80 per cent.), Russia coming next as a market. The U.K. and Belgium were the two chief markets for Indian wheat, the U.K. taking nearly 78 per cent. Of the imports of India the U.K. furnished all but a small fraction of the cotton piece-goods, and nearly 82 per cent. of the cotton twist and yarn. Of the iron, 76·5 per cent. of the quantity and 80 per cent. of the value came from the U K., 16 per cent. of the quantity and 12·5 per cent. of the value from Belgium: of the steel, 41 per cent. of the quantity and 48 per cent. of the value from the U.K., 48 per cent. of the quantity and 40 per cent. of the value from Belgium. As to sugar, see p. 382, note 1. Nearly 95 per cent. of the railway materials came from the U.K. The U.K. supplied 67 per cent. of the quantity, 71 per cent. of the value of the woollen piece-goods, as against 22·4 per cent. of the quantity, 19·6 per cent. of the value supplied by Germany. Of the coal, nearly 72 per cent. came from the U.K., 5 per cent. from Japan, 14 per cent. from Australia.

[2] Population, including suburbs and Howrah on the right bank of the Húglí, 1,300,000.

the seat of government of Bengal in 1772, and of British India in the year following.

741. **BOMBAY**[1]—by far the most important seaport in the west of India, and the rival of Calcutta in commerce and shipping —is likewise a town of recent origin, and a port that has had great predecessors in the same district. The predecessors of Bombay as a seaport were **Broach**, near the mouth of the Narbadá, and **Surat**, near the mouth of the Tápti; and the history of the three illustrates in an interesting manner the relation between physical features and commercial development. **Broach** is the oldest of the three. Under the name of *Barugaza* it is one of the oldest Indian seaports known in commerce with the east or west. Yet it seems always to have had a poor harbour, very difficult to approach. Its difficulty of access is at least mentioned as far back as the first century A.D. But in days when vessels were very small, and navigation slow, the shallowness of the river-mouth and the delay in entering were of very little consequence; and the mouth of the Narbadá has the advantage of possessing high banks out of the reach of flooding, and being contiguous to a highly productive region. **SURAT** shares with Broach the last-named advantage, and it has much better accommodation for shipping. The **Swally** (Suwáli) **Roads**, north of the mouth of the Tápti, afford a **safe anchorage** even for large vessels from October to April, though it is dangerous for such vessels during the prevalence of the south-west monsoon. The banks of the Tápti, on the other hand, are low and liable to inundation, a disaster which has more than once overtaken the town. The advantage of the harbour, however, began to prevail in favour of Surat in the sixteenth century, when direct commerce with Europe had begun. The Portuguese, the Dutch, and the English established factories (that is, trading stations) here, and in the seventeenth and eighteenth centuries Surat was the greatest seat of foreign commerce, and, latterly at least, the most populous town in India. **BOMBAY**, built on a small island, now connected, along with another larger island (Salsette) behind it, with the mainland, has the immense advantage over both its predecessors of possessing a harbour safe for large ocean-steamers in all weathers; but it had the misfortune to be backed by mountainous country, which cut it off from the more productive regions beyond. In 1661 Bombay Island was acquired by Charles II. from the Portuguese, and in 1687 the East India Company, to which it had previously been handed over, transferred thither, from Surat, the head-quarters of their possessions; but it was not till after the establishment of the improved communications with the interior mentioned above (727) that Bombay rose to the commanding position it now holds in the commerce of India. Its two famous predecessors are now visited only by coasting vessels, but the inland trade of Surat is still important.

[1] Population, 775,000.

742. **KARÁCHI** stands on a small bay to the west of the mouths of the Indus, and has been provided with a splendid harbour. Its wheat trade especially has recently grown with remarkable rapidity, and is now exceeded only by that of Bombay among Indian seaports. During fine weather vessels of any size can make use of the port, but during the south-west monsoon no vessel drawing more than 26 feet can enter or leave without special authority from the port officer.

742*a*. Most of the other seaports of the west coast have only fair weather harbours—safe in our winter months, but rendered dangerous by the heavy surf during the prevalence of the south-west monsoon. The harbour of **Goa** (Portuguese) is an exception, and the trade has begun to revive since **Mormugão**, at the south-west extremity of the harbour, has been connected by rail with the interior, as shown on the map on p. 384. **Calicut**, which has an anchorage 24 feet deep at low water spring-tides, and **Cochin**, which has a harbour available for ships of no more than 15 feet draught, still retain some importance in connection with the trade in pepper and spices, which drew the Portuguese to these ports at the end of the fifteenth century.

742*b*. The extraordinary importance of the trade in pepper and spices in past times it is difficult for us now to realise. The quantities that reached Europe were small compared with those which make up the trade of the world in such commodities at the present day, but the differences in value at the place of origin and in Europe enabled those merchants who escaped the risks of the trade to reap enormous profits. The cargoes brought back by Vasco da Gama after the voyage on which he discovered the sea-way to India were mainly of spices and pepper, and they are stated by Correa, the Portuguese historian of the voyage, to have yielded a profit on the voyage of 6,000 per cent. In Thomas Mun's *English Treasure by Forraign Trade*, written about 1630, the price of pepper in the East Indies is stated to have been 4*d*. a pound when it was 20*d*. in England. In a recent year the average price of pepper at Bangkok was a little more than 7*d*., when it varied from 8¼*d*. to 9¼*d*. in the London market.[1] As to the risks of the trade in past times, it is enough to mention that of the 86 ships sent to the East by the English East India Company in the first twenty-one years of its existence (1601–21) only 36 returned with cargoes, the others having been captured, lost, or worn out.

743. The south-east coast, where a low plain slopes gently out under a shallow sea, did not possess till recently a single safe harbour or navigable river-mouth. Ships anchor off the shore at several roadsteads, and goods and passengers have generally to be landed in flat boats through surf. **MADRAS**[2] has been made a seat of great trade, a trade, however, of less than one-sixth of the value of that of Bombay notwithstanding the populousness and productiveness of its

[1] *Foreign Office Reports, Ann. Series*, No. 2,898, p. 6.
[2] Population, 500,000.

hinderland, and even this has been achieved only by waging a constant struggle against natural conditions. The site of the city was ceded to the English East India Company in 1639, when Fort St. George was erected there. About a hundred years after Madras was already the most populous city in southern India. Down to the latter part of the nineteenth century, however, the trade was carried on in the same manner as at the other ports on this coast. In 1881 a harbour was nearly completed, when it was in great part destroyed by one of those irresistible hurricanes by which both sides of India are liable to be swept, especially about the change of the monsoons (May and October), and which on the eastern side raise the waves to a height unparalleled elsewhere. A new harbour was, however, completed in 1895, two moles of about 3,900 feet in length being run out seawards leaving an opening of 515 feet between them.

The voyage from Madras to Europe or the reverse is considerably lengthened by the necessity of passing round the island of Ceylon, which is nearly connected with the mainland by a string of islands and a shallow bank known as **Adam's Bridge.**[1] Only one channel, called the **Pámbam** (Paumben) **Passage**, across this 'bridge' has been sufficiently deepened to allow of its being used by good-sized coasters, and though dredging is still going on it is doubtful whether it can ever be made navigable for large ocean-going vessels.

The **minor Indian seaports** are **Chittagong**, on the north-east side of the Bay of Bengal; **Cocanáda**, at the end of one of the canals of the delta of the Godávari; and **Tuticorin**, in southern Madras, on the Gulf of Manar, this last having a harbour 12 feet deep at low water, which enables it to carry on a considerable export trade (about one-third of the value of that of Madras).

744. The **landward foreign trade** of India (not included in the tables on pp. 586–7, 610) has a total value of from four to five millions sterling each way, including the trade with Kashmír.

The trade through the western passes, which makes up about 20 per cent. of the whole landward trade, has already been considered (**722**).

The situation of many of the chief towns of India besides those mentioned in the text, and of the **French possessions** (Pondichéry, Karikal, &c.) and **Portuguese possessions** (**Goa, Daman, Diu**), is shown on the map opposite p. 380.

744*a*. **Kashmír** is the westernmost of the states traversed by the Himalayas, and is mainly composed of lofty mountains. It includes, however, the **lovely valley** of the same name lying, **at the height of rather more than 5,000 feet,** in a latitude corresponding to that of northern Morocco. **SRÍNAGAR,** on the Jehlam in this valley, is the largest town in the state and the centre of trade, the whole volume of which is also equal to about 20 per cent. of the landward trade of

[1] The long-discussed proposal for connecting India with Ceylon by rail by this route has now been abandoned in favour of a part-rail part-steamer connection.

India. From Srínagar there are several routes both south to the Punjab (the chief route being that leading to Amritsar) and north to the valley of the Indus; and from **Leh**, in the valley of the Indus in the east of Kashmír, a trade-route diverges northwards to Eastern Turkistan, across the highest pass in the world so crossed. This is the well-known **Karakoram Pass**, 13,500 feet in height—that is, upwards of 6,000 feet higher than Leh, and upwards of 14,000 feet higher than the towns of Eastern Turkistan (781). The chief articles of import into India from or through Kashmír are shawl-wool (210); charas, an intoxicating drug made from hemp; borax, and the precious metals. The exports, as in the case of all the other frontier states, include both European and Indian products.

744*b*. The native state of **Nepál**, the populous parts of which lie south of the main range of the Himalayas, and have many routes to the Indian plains, absorbs more than half the landward foreign trade of India. The chief imports therefrom are food grains, oil-seeds, timber, cattle, and horns. From **Khátmándu**, the capital, two routes branch over the central range of the Himalayas, and by means of these a small trade is carried on with Tibet.

744*c*. With **Sikkim, Bhután**, and the north-eastern states beyond the frontier of Bengal and Assam, the trade is very trifling, but hope is entertained of developing a considerable trade with Tibet by a series of **easy passes** known to exist in **Sikkim**. These passes, about 13,000, 14,000, and 15,000 feet high respectively, would afford communication with the most productive part of Tibet (782), and on the Indian side are within a short distance of the railway to Darjíling.

745. CEYLON. This island, a British Crown colony, about half the size of England, is mountainous in the south, a level wooded plain in the north. The **south-west**, which is the most populous region, gets the benefit of **rain from both the south-west and north-east monsoons**. Here the plains and lower hill terraces are covered with cocoa-nut plantations and rice-fields, belonging to the natives (Sinhalese), and the higher mountain terraces (below 5,000 feet) are occupied by the plantations of Europeans, the nature of which is indicated by the tables in the Appendix.[1] (See also 276, 287.) The **labourers** on these plantations are mainly immigrants from southern India. The **northern plains are arid** and require irrigation. Nowadays they are very **scantily peopled**, but remains of gigantic reservoirs and other extensive ruins show that at one time the population in these parts was much denser. The island has many minerals, but at present a very pure **graphite** (containing more than 90 per cent. of carbon) is the only one of commercial importance. Pearl fisheries are carried on in the Gulf of Manar, but they are uncertain. In 1903

[1] Except that there is now a large area of rubber trees, which are rapidly increasing their yield. See note p. 148. Cardamoms and essential oils from citronella grass and cinnamon leaf are also important.

they began to prove successful after twelve years in which no pearl oysters were obtained.

The chief seaports of the island are **COLOMBO**, which is connected by rail with the European plantations, and **Point de Galle** on the south coast, which was a much-frequented port of call before the opening of the Suez Canal. On the east coast there is a fine harbour at **Trincomali**, but its situation at a distance from the chief seats of production causes it to be of little value for trade.

746. INDO-CHINA, also called the Eastern Peninsula and Further India, is the peninsula between India and China. It is now **divided between Great Britain, Siam, and France, besides a few small native states**, chiefly in the minor peninsula, called the Malay Peninsula. The **British territory** is made up of the former empire of Burma (which, as regards administration, forms part of British India), together with the Straits Settlements and protectorates; the **French**, of Lower Cochin-China, Cambodia, Annam, and Tong-king. The northern part of the interior, which is very mountainous, is occupied by **Shans**, partly belonging to British and partly to Siamese and French territory, but practically in a large measure independent.

747. The mountainous character of a large part of the country, the existence of numerous extensive swamps in the more level tracts of the interior, and the defectiveness of the communications, go a long way to account for the **low density of population**, but among other causes have been devastating wars, inroads of robber bands from the mountains, and other consequences of the want of strong government. Since **Lower Burma** has been in the hands of the British, there has been **a constant stream of settlers** southwards and westwards, as well as of emigrants from India proper into that territory, and population, production, and commerce have rapidly increased. Owing to the scantiness of population relatively to the resources of the territory at the time of the British occupation Burma is to some extent in the position of a new country. 'There is plenty of good land to be had for the asking, on payment of a moderate tax.'[1] This leads, when security and a market are offered, to the rapid occupation of the land for the raising of export produce, principally rice (298).

748. With regard to the **communications** of the peninsula, it is noteworthy that **some of the chief rivers are very defective as waterways.** Above the large delta in Tong-king the **Song-koi** is navigable for steamers to within the Chinese frontier; but the longest river of the peninsula, the **Mekong**, has its navigation greatly impeded by rapids, the lowest of which are situated to the south of the Siamese-Cambodian frontier. The **Menam** is navigable for steamers only to the

[1] Sir Ch. Bernard, in *Scot. Geog. Mag.*, 1888, p. 74. This can hardly be true now, for in 1899–1900 more than 90 per cent. of the surface both in Upper and Lower Burma was in the hands of peasant proprietors. These provinces, however, still continue to show the most rapid increase of population in British India.

confluence of the two main headstreams, which meet to the south of 16° N.; and of these the eastern one is the only one navigable by boats. Timber (teak and sappan wood) is floated down the western branch from Raheng. The **Salwín** is scarcely navigable at all except at the mouth, and of all the rivers of the peninsula the **Iráwadi** is the most important for its navigation. This river is regularly **navigated by steamers as high as Bhamo**, in about latitude 24° N., a distance of about 900 miles, but there the further progress of steamers is impeded by rapids. The **Kyendwin** or Chindwin, the chief tributary of the Iráwadi (right bank), is also navigated by boats, but is ascended with no little difficulty on account of the strength of the current, which makes it a matter of three weeks to reach a point about 250 miles up.

749. The Iráwadi and Kyendwin are of high importance for the conveyance of the agricultural produce of the valleys, and the fact that they flow for the greater part of their course between ranges of forest-clad mountains gives them great value as carriers of timber. It is this circumstance that makes **Burma** the chief source of supply of **teak.** Although great forests of teak cover the Western Gháts in India proper, and forests of other kinds abound in other parts of that country, **Burma furnishes about 90 per cent. of the timber export (chiefly teak)** of **British India**, and by far the greater part of that export comes originally from Upper Burma.

750. The impediments to navigation in the greater part of the peninsula are not made up for by the existence of roads.[1] The deficiency of labour and road-metal, and the obstructions arising from forests and swamps, are among the **hindrances to the making of roads,** so that where there are no navigable rivers goods are mostly carried laboriously and expensively on the backs of elephants, oxen, ponies, and other beasts of burden, or by human porters. **Carts are an exception.** In some places carriage has already been cheapened by the construction of **railways**, and there are now various projects actively promoted for the extension of this means of transit. The chief railways already in existence are two starting from Rangoon, the principal port of Burma. These railways have been constructed **on opposite sides of the Pegu Yoma Mountains,** which separate the valleys of the Iráwadi and Sitang, the one proceeding to Prome, an important town on the Iráwadi, and the other northwards up the valley of the Sitang past **MANDALAY,** the capital of Upper Burma. **Saigon,** the chief port of Cochin-China, has been **connected by rail with Mytho,** on one of the main arms of the Mekong delta, although the Saigon river is likewise connected with the larger stream by a natural navigable channel uniting these two ports. A railway from **BANGKOK,** the capital of Siam, **to Khorat,** running in part through a rich alluvial plain, was

[1] At the end of 1900 there were 1,587 miles of metalled roads in Burma, in Siam in 1902 only about 100, all of recent construction, and about 50 miles round Hanoi in Tong-king.

opened in December, 1900, and a branch to **ZIMME**, Chieng-mai or Kiang-mai, a town lying in a fertile valley and long celebrated as a commercial centre,[1] is in progress. This line it is proposed to carry as far north as Kiang-sen on the Siamese frontier.[2] As to the Laokai railway in Tong-king, see the end of the note on pp. 404–5.

751. **RANGOON**,[3] **the chief port of Burma**, as already mentioned, stands on the Rangoon River, an arm of the Iráwadi delta, but one which is not navigable directly to the Iráwadi itself, although in the rains there is a navigable connection with that river. Two-thirds in value of the exports of Burma are shipped from this port, which is accessible at spring-tides to the largest vessels. Its health has been greatly improved by the introduction of a supply of pure water. The **minor ports** of Burma are **Bassein**, on a western arm of the Iráwadi delta; **Akyab**, on the Bay of Bengal, the port of the division of Arakán; **Maulmain** or Moulmein, at the mouth of the Salwín, the chief port of the Tenasserim division, admitting vessels of 23 feet draught at spring-tides; **Mergui** and **Tavoy**, still smaller ports on the still narrower parts of Tenasserim further south. Maulmain, like Rangoon, can be kept open for large vessels, but much dredging is necessary at the former port to keep the approach free from obstructions.

752. Besides rice and teak the **products of Burma** include cutch, rubber, petroleum, coal, gold, jade, and rubies. **Petroleum**[4] has long been a commercial product of some importance in both Lower and Upper Burma. It is obtained both from islands on the west coast and in the Iráwadi valley. **Three coalfields** are known in Upper Burma, that supplying the best coal being in the valley of the Kyend-win. Gold, jade, and rubies are all products of the northern parts of Upper Burma. The Burmese **jade** forms the chief supply of that mineral in the markets of China and Japan, where it is of great value. The **ruby mines** of Burma (at Mogok, a high valley to the east of the Iráwadi, about half way between Mandalay and Bhamo) furnish the only rubies of the finest colour to be found anywhere.

753. **BANGKOK**[5] is a bad port. **A bar at the mouth of the Menam** necessitates the discharge of cargo from ships drawing more than 13 feet in the Gulf of Siam. British shipping is declining at the port, the fundamental reason being apparently that British ship-owners are finding it more economical to work larger vessels than are suited to its trade. The town is now well provided with paved streets, and has electric tramways and electric lighting, but pure water is still a desideratum.

754. In **Annam** the chief port is **Turan** or Tourane, which lies on a

[1] Before 1590 it was visited by Ralph Fitch (716*b*), who describes it under the name of Iamahey as 'a very faire and great towne, with faire houses of stone, well peopled, the streets are very large, the men very well set and strong.'

[2] The project of the connection with Maulmain is now in abeyance.

[3] Population, 240,000.

[4] See map, p. 384, and par. 407.

[5] Population, probably above 400,000.

bay about half a degree to the south of **Huë**, the capital of the province. In **Tong-king** the chief port is **Haifong** or **Haiphong**, which has been built by the French on former rice-swamps on the delta of the Song-koi, and is now a town lighted by electricity, with regular steamer services to Hong-kong, Pakhoi, and Hoi-hou (island of Hainan), and having the railway connections shown on the map at p. 404. The railways are all on the metre-gauge. That to **HANOI**, the capital of the province, crosses the Red River by a bridge more than a mile long. Hanoi itself is accessible to smaller sea-going vessels, and carries on direct trade with Hong-kong. Although on the site of an old town, it is entirely a French town, solidly and even almost magnificently built in European style, lighted by electricity and well supplied with water.

755. Among the **minor products of Tong-king** may be mentioned indigo and cotton, both of which are increasing in importance. The indigo of the province threatens, it is said, to rival that of Bengal.

756. **The Malay Peninsula** is the name of that part of Indo-China which projects south-eastwards nearly to the equator. It is highly mountainous, and clothed with dense tropical forests, but at its northern end, at the **Isthmus of Kra** (between 10° and 11° N.), there is a gap separating the mountains of this peninsula from those of the main body of Indo-China. This gap is only about 100 feet in height at the highest part, and it has often been proposed to pierce this isthmus by a ship-canal, which would shorten the route from Calcutta to China by 660 miles and that from Burma to Bangkok by 1,800 miles.[1]

756*a*. The peninsula is **partly under British rule, partly divided among a number of small states**. The states in the north acknowledge a certain allegiance to Siam, but those in the southern half are more or less under British influence. The island of **Singapore** in the extreme south, the small territory of **Malacca** on the west coast, and the island of **Penang**, with one or two smaller islands and the patch of mainland called **Province Wellesley** further north, **form the British Crown colony of the Straits Settlements.** The remainder of the south is occupied by the British protected states of Perak,[2] Selangor, Sungei, Ujong (with Jelebu), Negri Sembilan, Pahang, Kedah, Kelantan and Trengganu, and the independent state of Johor, which, however, has placed itself under British control as regards its external relations. The protected states have formed a single federation since July 1896. The governor of the Straits Settlements also has under his care the Cocos or Keeling Islands and Christmas Island in the Indian Ocean.

The natives of the peninsula are Malays, whence the name; but the **Malays are being ousted in trade and industry by** settlers from abroad

[1] The route for a canal has been surveyed, but the project has, for the present at least, been abandoned.

[2] The final *k* not pronounced.

of a more enterprising temperament. These are mostly **Chinese and Indians**, the latter mainly from southern India, and known in the peninsula as Klings.

Guttapercha, rubber, cacao, pepper, and many other tropical products are obtained from the forests and plantations, but the chief export product is **tin**, for the mountains running through the peninsula and reappearing in islands further south (759) are the richest part of the world in this metal. The wealth derived from these tin mines [1] has been the chief means of converting a proud and lawless people into a submissive and orderly community. It has rendered possible a capable and honest government, and has enabled native chiefs to see their interest in listening to the monitions of British residents clothed with little formal authority. Weapons, formerly universally worn, have been discarded. The prosperity of mining has encouraged the development of various agricultural industries. Short railways have been opened to several ports.[2] Commerce of various kinds has extended. Population has rapidly increased.[3] The largest supplies of tin in the peninsula are at present obtained from **Perak**, in the north-west of the British region.

756*b*. The Straits Settlements also derive great importance from their **favourable situation for local and oceanic shipping. Malacca,** captured by the Portuguese (Albuquerque) in 1511, and from them by the Dutch in 1641, was in the sixteenth and seventeenth centuries the chief centre of commerce in the Far East. In 1824 it was ceded by the Dutch to the British. Meantime, however, it had **deteriorated as a port by the silting-up of its roadstead**, and it was rapidly eclipsed by the port of **SINGAPORE**, which was founded in 1819, on the island of that name, by Sir Stamford Raffles, who justly estimated the unrivalled advantages of its situation. Singapore is now, therefore, the great *entrepôt* and coaling-station of the Far East. Its harbour allows of ships with a draught up to 36 feet loading and discharging alongside of the quays. There are also large shipbuilding yards and means for efficiently repairing vessels of the largest size and their machinery. There are large tin-smelting works both here and in Province Wellesley. Since the opening of the latter in 1903 **Penang**, which has an excellent harbour, has become the chief place of export of Perak tin. On the west coast of the mainland **Port Weld, Teluk Anson, Port Swettenham,** and **Port Dickson** are all convenient ports, above all Port Swettenham, the former Kwala Klang, in 3° N., which is described as the most commodious and best equipped port on the Malay Peninsula.

[1] Estimated about 1901 to furnish more than 60 per cent., in 1908 about 45 per cent., of the tin supply of the world.

[2] A line running from Province Wellesley in the north to the south of the peninsula was completed in December 1908.

[3] Population of Straits Settlements: 1871, 307,000; 1901, 572,000. Protected States: 1891, 420,000 (approximately); 1901, 680,000.

757. **THE EASTERN, OR MALAY, ARCHIPELAGO** embraces all the islands in the south-east of Asia, with the exception of those belonging to China and Japan, as well as of New Guinea and the islands immediately adjacent. The islands are **almost entirely in the possession of European Powers**, and the greater number belong to the Dutch. To the Dutch belong the Great Sunda Islands of Sumatra, Java, and Celebes, with the greater part of Borneo; all the Lesser Sunda Islands, except the north-east of Timor, which is Portuguese; and theirs also are the Moluccas which lie between Celebes and New Guinea. As regards commerce **Java** and **Madura** are the most important islands of the whole group. The possession of a rich volcanic and alluvial soil, combined with facilities for irrigation, confers great natural advantages, and these, together with the efficient system of government pursued by the Dutch, have enabled these islands, though only about equal in area to England exclusive of Wales, and thus containing less than **one-fifteenth of the land belonging to the whole archipelago**, to support **more than half the population** of the group. The density of the population in the islands approaches that of England, and the number of the inhabitants is still increasing with great rapidity. The **great staple** product of Java is **coffee**, but, as in Ceylon, this branch of cultivation has latterly been giving place to that of other tropical products, principally **tea** and **cinchona**. On the plains the cultivation of **sugar-cane** is rapidly extending, especially in the district round **Surabaya**, the chief eastern port. Tobacco, cacao, and indeed all other tropical products, are of more or less importance. **Many** of the coffee and cinchona **plantations belong to the government**, and are either cultivated for the government by natives (**286**), or are rented by private planters. The produce of the government plantations is forwarded to the Netherlands by the Dutch Trading Company, founded at Amsterdam in 1824, and is there sold by auction.

757*a*. **BATAVIA**, on the north coast in the west of Java, is the capital of all the Dutch possessions in the East, and has a trade similar to that of Singapore. Its **harbour** having, like that of Malacca, become **silted up**, a new harbour (Tanjong Priok) has been constructed six miles away, which has a depth of 28 feet at ordinary spring-tides. On the hills to the south of Batavia, at the distance of about thirty miles, stands the charmingly situated town of **Buitenzorg**, a sanitarium for Europeans, and the seat of a palace of the Governor-General of the Dutch East Indies.

758. Besides Java, the only islands belonging to the Dutch that need be mentioned on account of their agricultural commercial products are Sumatra, Celebes, Bali, and the Moluccas. **Sumatra** is a large island with a backbone of mountains in the west and an alluvial plain about 600 miles in length and from 60 to 110 miles in width on the east. This plain is, however, to a large extent marshy and thinly peopled, and the chief commercial product is coffee, obtained from the slopes of the

western mountains. In the north-east, however, round **Deli**, the soil has proved to be admirably adapted for the cultivation of **tobacco**, which is hence rapidly extending here and leading to the neglect of this crop in other parts of the Dutch East Indies. The chief ports of Sumatra are **Padang** and **Benkulen** on the west coast, and **Palembang** on a navigable river traversing the eastern plains.

The surplus products of **Celebes** are obtained mainly from the peninsula of **Menado** in the north-east, where there is a rich volcanic soil, producing **coffee** and now also **cacao**. A considerable quantity of **coffee** is also produced in **Bali**. **Macassar**, in the south-west of Celebes, has a fine roadstead, and on that account, as well as because of the other advantages of its situation, is a place of great commercial importance.

758*a*. The **Moluccas**, or **Spice Islands**, are a group of islands of which the principal are Halmahera or Jilolo, Ternate, Tidore, Bachian, Buru, Ceram, Amboina and the Banda Islands. They are still noted for the spices, especially cloves and nutmegs, to which they owe their name. Both Amboina and the Banda group (**342**) lie to the south of Ceram. The small islands of **Ternate and Tidore**, to the west of Jilolo, were each formerly the seat of a powerful sultan, and Ternate is still the centre of local trade in these Eastern waters.

759. Besides agricultural produce the Dutch East Indies are of commercial importance from their **mineral wealth.** So far the **tin** of the islands of **Banka and Billiton**, which form the continuation of the tin-bearing region of the Malay Peninsula, is the only mineral that has attained any great value in commerce; but coal is very abundant, and steps are at present being taken to develop one or two of the coalfields. The **Ombilin coalfield in Sumatra**, in a mountainous district forty miles east of Padang, yields steam coal of fair quality, and has been connected with the new harbour of Emmahaven, five miles from Padang, by a railway, which also serves some fertile and densely peopled valleys in the volcanic area of middle Sumatra. Coal is also found at many places in **Borneo** at no great distance from the coast, both within and without the Dutch boundary. (See map, pp. 404–5.)

760. The whole of **northern Borneo** is now **under British protection.** It is made up of a section in the north-east subject to the British North Borneo Company; another, to the south-west, to the native sultan of Brunei; and a third, Saráwak,[1] still further to the south-west, to a rajah of British family. **British North Borneo**[2] has several safe and commodious natural harbours, though not as many as would appear from the outline on the map, some of the openings being encumbered with coral reefs. **Sandakan**, the capital, stands on one of the best of these

[1] Final *k* not pronounced.

[2] Judged by statistics, both British North Borneo and Saráwak appear to be prospering. In recent years the value of the exports down to 1906 inclusive has been steadily growing, allowance being made for fluctuations in exchange.

on the north-east coast. Kudat Bay, on the north, also contains an excellent harbour. Both coal and gold are found, but the chief exports are jungle produce (guttapercha, rubber, rattans, camphor, &c.), fine timber, and plantation products such as tobacco, sago, coffee, coconuts, pepper, and gambier. The tobacco is of the kind suited for cigar-wrappers. A railway 110 miles long is being laid from Weston on Brunei Bay northwards to Jesselton on Gaya Bay through land well adapted for plantations. Twelve miles to the south are the famous **birds'-nest caves** of **Gomanton**, which yield an important export. The small island of **Labuan** to the west of Brunei, formerly a British Crown colony, was handed over to British North Borneo in 1890 and then transferred to the Straits Settlements in 1906. It has a good port and coal deposits, the yield of which has lately been increasing. **Saráwak**,[1] in which the river Rejang is navigable by steamers for 160 miles, has similar products to those of Borneo, pepper and sago being the chief.

761. The **Philippine Islands**, along with the island of **Paláwan** and the Sulu Archipelago, belonged till 1898 to Spain, but from that date have been a possession of the United States. They are volcanic and much subject to destructive earthquakes. The great bulk of the population of these islands inhabit **Luzon**, which is accordingly the only island of great commercial importance. The chief commercial products are **Manila hemp** (**317**), **sugar, tobacco and cigars, and copra.** An insect has for the present ruined the bulk of the coffee plantations. There are extensive sugar plantations in the Iloilo district in the south of the island of Panay. The highland provinces facing the northern part of the west coast of Luzon form an important mineral district said to be rich in copper, coal, and gold. A railway 122 miles long runs northwards from **MANILA**, the capital and chief port of the entire group, at the head of a bay on the west of Luzon, to Dagupan on Lingayen Bay, passing through the chief hemp and sugar plantations of the island. Manila Bay forms an excellent anchorage, but only vessels of 12-feet draught or less can come up the Pasig river to the quays of the port. A fine harbour is now being formed in the bay. Chinese immigration and industry have added greatly to the productiveness of the islands in recent years.

762. CHINA. This vast country is the only part of the mainland of Asia besides India with a population of high density. In this we see a result of the seasonal rainfall distribution. Though the winter temperatures are cool even in the south, and in the north and most parts of the interior rigorous[2] (**39**), the rains occurring, as in monsoon regions generally, during the season of high temperatures promote an enormous vegetable production. The figures given for the population of China Proper

[1] See note 2, p. 397.

[2] The mean January temperature at Canton on the Tropic of Cancer, about 55° F.; at Zikawei (Shanghai), in about 31° N., 37° F.; at Peking, in 40° N., 23° F.

were formerly only vague estimates, but a recent census[1] confirms the previously entertained ideas as to the high density of population in the greater part of the **great plain in the east**, which stretches from the mountains in the north of Peking to those south of the Yangtse-kiang. This plain thus extends, roughly speaking, through **ten degrees of latitude**, from about 30° to 40° N., and its greatest width is about the parallel of 35°. It extends everywhere to the coast except in the province of **Shantung**—that is, 'the Eastern Mountains' —the province which juts out between the Yellow Sea and the Gulf of Pechili. Another large and densely peopled plain lies on the middle Yangtse and the lower course of its great northern tributary, the Han. (See map, pp. 404–5.)

763. Another region of high density is in the south-east, forming the province of **Kwang-tung**, which is largely composed of a deltaic alluvial plain. And in the west there is a third region of exceptionally high density of population in the east of the province of **Sechwan and the north of Yünnan**, where, besides great mineral wealth, there is a peculiar red soil of extreme fertility. **CHENGTU-FU**, the capital of Sechwan, is a town estimated to possess a million inhabitants. West of the great plain, China is for the most part elevated and to a large extent mountainous, but even the elevated regions are in some places capable of supporting a numerous population. This is so, for example, in the region of the red soil just referred to. Where that soil is found cultivation can be pursued to a great height up the mountains; and, according to Captain Gill, the Chinese in eastern Sechwan cultivate the hill-sides wherever the slope is not above 30°, which, he remarks, is about the steepest a man can walk up unaided by his hands.

764. The northern half of China again is covered, and vast hollows to a great depth filled, with a peculiar **yellow soil** known as lœss, which is also of remarkable fertility, and rewards cultivation even at great heights. Richthofen, who has described this soil in great detail, states that in the region where it prevails he has seen a plateau at the height of 7,000 feet above sea-level covered with fields and villages. This soil is **light and easy to work**, but it has one great drawback. Its **productiveness**, though often very great, is very **uncertain**. The soil is so **porous** that water runs through it with great rapidity, and crops are thus liable to suffer from drought unless refreshed with frequent showers or supplied with water by irrigation. And so it happens that a region which when rain falls with sufficient frequency yields the most abundant crops, may in other seasons have its crops entirely destroyed, though the rainfall may have been plentiful enough for soils of another kind. **Irrigation**, therefore, is practised throughout this region

[1] A census of the eighteen provinces of China Proper was completed by the Board of Revenue early in 1903, and the result showed a grand total of upwards of 407,000,000, equal to an average density of about 265 to the square mile. The most densely peopled provinces were found to be Shantung, with more than 580, and Honan with 520, to the square mile.

wherever the structure of the ground admits of it, and lands that can be irrigated are in some places of ten or twenty times the value of 'dry' fields. **Many parts** of China are, like certain parts of India (731), **pitted with wells like a sieve**, every field having one.

765. Hitherto China has depended mainly on its agricultural resources, but its **mineral wealth** is known to be enormous. The whole area of the **coalfields** of China is estimated to be perhaps twenty times as great as that of all the coalfields of Europe. These coalfields exist in many places where there is already a dense population, and much of the coal is of excellent quality. One coalfield about seventy-five miles **north-east of Tientsin** has long been worked on the European system, and has been connected by rail with a navigable river. Other small coalfields exist in the vicinity of Peking. A small coalfield, containing excellent bituminous coal, lies in the west of the mountains of **Shantung**. But the great coalfields of China lie further in the interior. The southern half of the province of **Shan-si** has enormous deposits both of anthracite and bituminous coal at the height of between 2,000 and 3,000 feet above sea-level (see map, pp. 404–5). The south-east of this province forms one of the most remarkable mineral regions in the world. The anthracite here found is very pure. In superficial extent about 13,500 square miles, the deposit is the largest of the kind known to exist. While the average aggregate thickness of the coal-seams is at least 40 feet, almost everywhere there is to be seen a seam of from 15 to 20 feet, mostly one from 20 to 30 feet in thickness. So frequently does the productive part of the coalfield crop out on the surface, that along one line about 200 miles in length an opening might be made direct into a seam of great thickness almost anywhere. The stratification seems to be undisturbed, and in many places it is nearly horizontal. Along a line, the limits of which are indicated on the map (pp. 404–5) by two crosses, there crops out a seam of from 20 to 30 feet in thickness, with an easterly slope only just sufficient for drainage, and into this levels could be tunnelled for miles to the west, so that once a railway had been constructed to the surface of the plateau the wagons could be run into the mines and loaded with coal for Peking or Shanghai direct. An outlying portion of this coalfield, known as the **Chinghwa coalfield**, lies at a lower level on the slope of the plateau in northern Honan. Moreover, this coalfield is rich in the most excellent **iron ores**, both in the north near Loping and in the south round Tsechou, as well as in potter's clays.[1] In the south-west of the province are enormous deposits of salt.[2] The whole of south-eastern **Hunan** has been described as one enormous coalfield, and the same description has been applied to eastern **Sechwan** and northern

[1] See the full account of this coalfield in Richthofen's *China*, vol. ii. pp. 439–40, and 473, &c.

[2] The right to work all the minerals of Shansi has been conceded to a British or Anglo-Italian company known as the Pekin Syndicate, which is taking active steps with a view to the development first of the Chinghwa coalfield.

Yünnan. Sechwan is also rich in salt and iron ore, and Yünnan remarkably rich in copper, to a less extent in silver, while there are important tin and other mines near Mengtse or Mongtse in the south-east of the province.

766. The chief thing that has so far hindered the development of these resources is the want of adequate **means of communication.** Communications throughout the great plain of China are naturally easy. **Inland navigation** is carried on both by rivers and canals, and one great canal, 700 miles long, runs through nearly the whole length of the plain. Commencing at Hangchau, at the head of the inlet, to the south of the estuary of the Yangtse-kiang, it crosses both that river and the Hwang-ho, and terminates at Tientsin, on the Pei-ho, the inland port of Peking. It was constructed in the early part of the seventh century, and is still a fine waterway as far as about 35° N., but to the north of that its navigation is much impeded. North of the Hwang-ho the Pei-ho and its numerous feeders in the plain of Chili or Pechili afford considerable facilities for water-carriage.

Navigable rivers facilitate the communication between the great plain and the province of Kwang-tung. Two streams, each navigable nearly to its source, leading on different sides up to an easy mountain pass, called the **Meiling Pass,** on the northern frontier of the province named, connect the provinces of Kwang-tung and Kiang-si (the route from Canton to Kiukiang); and two others similarly connect Kwang-tung through Hunan with Hupe (the route from Canton to Hankau).

767. Between the east and the west of China, however, communication is not so easy. Three great rivers, the Hwang-ho or Yellow River in the north, the Yangtse-kiang in the middle, and Si-kiang or West River in the south, cross the country from west to east, but only the second of these is of great service for navigation. The **Hwang-ho,** well called 'China's sorrow,' is too rapid, too much obstructed by shallows, and too shifting in its course to be easily navigated. Its navigation is wholly interrupted in the easterly part of its course in northern Honan, and again on the greater part of its course on the western frontier of Shansi, where it plunges through a profound chasm; and, on the other hand, it is liable to cause terrible destruction by sudden changes of its bed in its course through the plain. At certain periods it has entered the sea by a north-easterly course to the Gulf of Pechili, at others by a south-easterly course to the Yellow Sea. By a change of this nature in September 1887 at least one million human beings are estimated to have perished. In January 1889 the river was again brought back to its previous course by which it entered the Gulf of Pechili.

768. The **Yangtse-kiang is an admirable watercourse as far as the town of Ichang** in about 111½° E.—that is, for above 1,000 miles from its mouth. Thus far steamers can ascend, and even ocean-going

steamers can reach as high as **HANKAU**,[1] 680 miles up, and there get loaded with tea and other products for Europe and America. Beyond Ichang, however, a series of difficult rapids impede the navigation for about 400 miles; and as the mountain tracks between Ichang and **CHUNGKING**, the great river-port of Sechwan, are likewise extremely difficult, that rich province is in a large measure shut off from communication with the great eastern plain. Such commerce as is maintained with this region mostly follows the river route. It is carried on in boats of four or five to about ninety tons or even more, and the journey up between the ports above-mentioned occupies from three weeks to about fifty days, according to the state of the river being longest when the river is high. The journey down takes from four to ten days. The packages of goods for this water trade have to be made of sufficiently small size for them to be readily lifted out, as at the most dangerous parts of the rapids the boats have to be emptied and dragged up. The freight for a package of shirtings of about 1½ cwt. is from 10*s*. 8*d*. to 12*s*. (Comp. 17*a*.)

769. This obstruction to communication is all the more serious from the fact that the **provinces thus shut off from one another are mutually deficient in commodities which the others supply**. Rich as the soil of Sechwan is, it is not suited to any great extent for cotton, which in China is mainly grown on the lœss. On the other hand, Sechwan is one of the richest of all Chinese provinces in silk, and both it and Yünnan are well adapted for opium. It has already been stated that valuable minerals also abound. Hence it is that, notwithstanding the existence of these obstructions to navigation, the river traffic on this section of the Yangtse-kiang is very active. No fewer than 5,000 boats are estimated to traverse this route each way in the course of the year. Yet, if we take the average cargo at 25 tons, this large traffic represents only about 125,000 tons either way—a small commerce for regions so populous and so much in need of each other's products. Small steamers have ascended this part of the river, but do not yet carry on a regular traffic. The first to ascend was a British steamer in 1898, but it was intended for local traffic on one of the navigable rivers of Sechwan above Chungking.[2] The most important of these are the Kialing or Siao-ho, which joins the Yangtse from the north at Chungking, and the Min, which has a navigable branch connecting the Yangtse with Chengtu-fu.

770. The third of the great rivers above mentioned, the **Si-kiang**, is navigable more or less for the greater part of its course, but rapids impede the navigation at many places. These hindrances, however, are not of the same consequence commercially as those which occur in the course of the Yangtse-kiang.

[1] A large British man-of-war has even ascended to this port.

[2] Early in 1910 a powerful tug steamer with flat bottom specially built in the United Kingdom to the order of a Chinese firm began to run on this stretch.

771. But even at their worst the rivers of China are better than any other means of inland communication. Clumsy carts are used in the north, but in the south there are comparatively few roads fit for wheeled vehicles. In general the cost of land carriage by any method appears to be upwards of 6*d.* per ton per mile, or about twenty to forty times as great as on a river of easy navigation,[1] a cost which must obviously confine to narrow limits the amount of traffic in bulky commodities.[2] But the modern means both of production and transport have hitherto been regarded by the Chinese authorities with noted dislike, chiefly, it would appear, from dread, partly from contempt, of the foreigner. All schemes for the extension of foreign trade in China have to overcome the resistance arising from this dislike, and special difficulties in doing so have to be encountered in consequence of the peculiar character of the Chinese government, which may probably be regarded as in a large measure the result of the remarkable geographical isolation of the country.

771*a*. Surrounded on the land side almost completely by mountains and highlands difficult to traverse and very scantily peopled, it has had a separate history from all the rest of the world. It has developed a government which proved for many centuries well adapted to its own circumstances, but not adapted to the maintenance of well-defined relations with foreign countries which might claim to stand on an equal footing. A central government claims authority over the whole, but Chinese life goes on to a large extent independently of this central government. Chinese dynasties have changed again and again, but Chinese life remains the same. There is apparently no country in the world in which a central authority is so much restricted by the customs and traditions of local government and local feeling. It has thus often happened that the central government in treating with foreign powers has entered into engagements which it has no power to make good against the passive resistance of the people. 'China,' it has been said, 'occupies the unique position of a state resting on moral force.'[3]

771*b*. Another difficulty arises from the mode in which the government officials are appointed. All offices are conferred (at least nominally) on successful candidates in examinations, but in fact great expenses are nearly always incurred before appointments are obtained, and the salaries of the offices are generally inadequate at once to meet the expenses of living and to recoup the holders of office for the outlay previously incurred. Of such conditions corruption on the part of the

[1] See the particulars collected on this head in a paper on 'The Resources and Means of Communication in China' by the author of the present work in the *Geog. Journ.* xii. pp. 503-6.

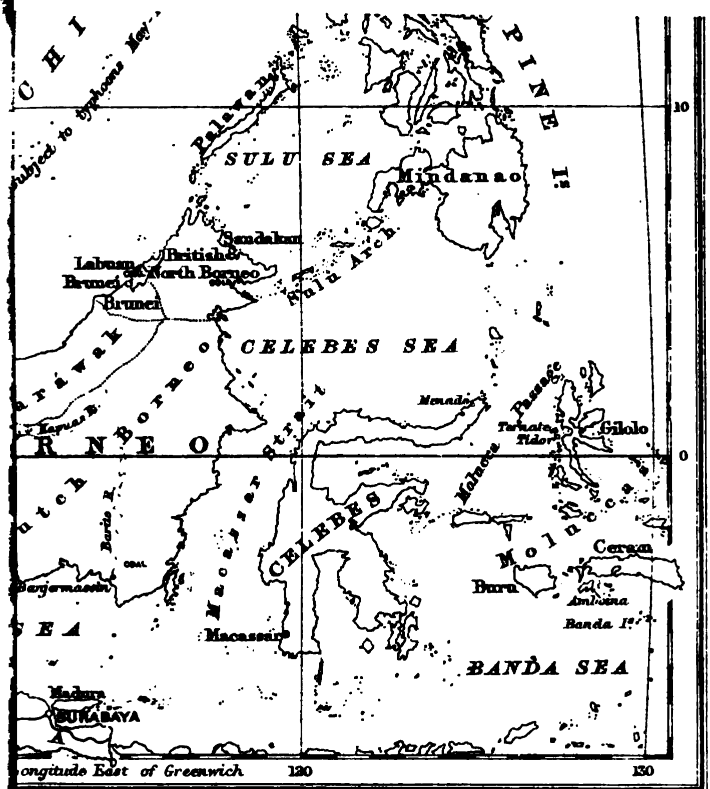
[2] No one could read the account of village dwellings, country roads, and ferries given in Chapters II., IV. and V. of *Village Life in China*, by A. H. Smith, D.D. (1899), without obtaining a lively impression of the privations of Chinese existence consequent on the deficiency in the means of communication.

[3] A. Michie, *The Englishman in China*, ii. p. 369.

great body of the office-holders has always and everywhere been the inevitable result. Illegal exactions on their part are generally winked at. Formerly this was a recognised moderate and tolerable evil, but intercourse with foreigners, raising in many cases the ambitions and increasing the expenses of the officials, is tending to make it intolerable. The deep-rooted corruption, on the other hand, causes the officials as a body to be hostile to all foreign influences that might lead to reform. The official feeling towards foreigners is, however, only partially shared by the great body of the people, who in many cases show no unfriendliness.

771*c*. But in spite of all obstacles the irresistible pressure of circumstances has gradually been forcing changes both on the governing classes and the people generally. The opening from time to time of new treaty ports (776) is one illustration of this. The needs of the central government favoured the adoption of the electric telegraph, and the establishment of arsenals provided with modern means for the manufacture of munitions of war in different parts of the empire. At first the official feeling was strongly opposed to **railways**. The first railway in China was a short line from Shanghai to its outport Wusung, opened in 1876, but it was purchased by the viceroy of the province and torn up in the following year. Afterwards a railway was laid from the Kaiping collieries east of Peking to the mouth of the Pei-ho, and at a later date from this latter point to Tientsin. The continuation of the Kaiping line north-eastwards to Manchuria was afterwards encouraged by the government for strategic purposes. In 1897 Tientsin was connected by rail with Peking, and railway concessions have since been obtained for the vast projects shown on the accompanying map, as well as for others.[1] As

[1] The Kaiping collieries railway, opened in 1881, now forming part of the Imperial Northern Railway, is the oldest of the still-existing railways in China. Many railway concessions have been granted to foreign companies, but of late the Chinese government has shown a resolute intention of favouring the construction of railways by Chinese companies and, where foreign capital is utilised, making sure that the conditions under which it is used shall not bring with it political influence. In some cases concessions already granted to foreign companies have been cancelled. The Imperial Northern Railways (Peking-Tientsin-Taku-Niuchwang; Peking-Kalgan, &c.), are Chinese, but the other railways wholly or partly in Manchuria are in foreign hands, that from the Manchurian frontier to Tairen (Dalny) in those of Russia and Japan jointly, and that from Harbin to the eastern frontier (on the Vladivostok route) Russian. The line from Peking to Hankau, successively known as the Pehan, Luhan, and (now) the Chinghan line (completed in November 1905), belongs to a Franco-Belgian company, and a Belgian company with a Chinese government guarantee is constructing the line from Kaifong to Singan-fu. The British lines are that of the Pekin Syndicate from Taukou (a navigable point on the Wei) to the Ching-hwa coalfield, and those of the British and China Corporation (Wusung-Shanghai-Nanking—to which point it was completed in March 1908; the projected continuation westwards to Sinyang on the Chinghau line, and the lines in progress from Shanghai by Hangchou to Ning-po, and from Kaulun to Canton, which is expected to be reached in 1909). All the railways in Shantung are German, and the railway from Tientsin to Pukau, opposite Nanking (the final agreement for which was signed in January 1908), is to be constructed partly by British and partly by German capital. The narrow-gauge line through Shansi to Singan-fu is financed by the Russo-Chinese Bank, and the



ndon, New York, Bombay & Calcutta.

soon as introduced both telegraphs and railways have always been eagerly made use of by the people. Commercial competition has led to the adoption of other European inventions. The increasing production of silk in Europe and Japan has induced Chinese producers to adopt silk-filatures (224), and the competition of India and Ceylon in tea has caused some Chinese growers to introduce leaf-rolling machinery. Cotton-mills equipped with the latest machinery and conveniences have been erected at Shanghai, Hangchau, Ningpo, Wenchau, and elsewhere. Extensive iron and steel works have been established by the viceroy of the Hukwang provinces (Hupe and Hunan) at Hanyang. Chinese students are making themselves acquainted with western science and learning in Europe, America, and Japan, as well as at colleges in their own country (such as the Nanyang college at Shanghai and one at Tientsin), and an active and widespread native press is tending to bring about the same result.

772. Increased facilities for commerce were given in 1898 by throwing open the navigation of the inland waters of China to foreign vessels, though the value of this concession was greatly diminished by the harassing regulations afterwards issued. In 1902 an important treaty was concluded between China and Great Britain, by one provision in which it is hoped that the internal customs duties on foreign goods, known as *likin* and by other names, at present levied at numerous inland barriers, will be entirely abolished. Under this treaty it is provided that from January 1, 1904, *likin* and all other taxation on foreign goods shall be abolished in consideration of the payment on most of such goods of an import duty amounting in all to 12½ per cent., instead of the 5 per cent. duty at present in force. Opium is still to be charged 33 per cent. *ad valorem*, with a surtax in place of *likin* and other internal customs. Native customs houses are, however, still to remain, both on the coast and in the interior, for the taxation of native goods not intended for export, and the Chinese government reserves to itself the liberty to recast the foreign export tariff so far as practicable with specific duties on a scale not to exceed 5 per cent. *ad valorem*, with a surtax of 2½ per cent. in substitution for *likin* and all other internal taxation. Another important provision is the clause equalising the duty on goods carried by junks and sailing-vessels to that on goods carried by steamers. It is also provided that an excise duty equivalent to double the import duty at present levied is to be charged on all machine-made yarn and cloth manufactured in China whether by foreigners at the treaty ports or by Chinese anywhere in

railway from Laokai in Tongking to Yünnan-fu (which was reached early in 1910) is French. The Canton-Wuchang railway, or Yuen-han line, is now in Chinese hands, and under a Chinese engineer-in-chief appears to be making satisfactory progress from Canton. As further signs of Chinese progress in railway matters it may be mentioned that the Peking-Kalgan railway is also being constructed entirely by Chinese, and that the government ironworks at Hanyang turned out a considerable portion of the rails for the Chinghan line. For a concise but comprehensive account of Chinese railways see a paper by Mr. Barry in *Jour. Soc. Arts*, May 21, 1909.

China, but this stipulation is not to apply to the Hanyang ironworks and other similar government works at present exempt from taxation, arsenals, government dockyards, &c. China also agrees to establish a national currency.

773. It is probably safe to say that there is no country in the world in which the consequences of the extensive introduction of railways and machinery are likely to be more momentous. When we consider the nature of the climate (762), favourable at once to energy in the people and productiveness of the soil, the nature and extent of the undeveloped resources, the great density of the population, the advanced state of civilisation, and the character of the inhabitants, who are distinguished not merely by the most assiduous industry but by a high degree of business capacity including remarkable fidelity to their pecuniary engagements,[1] we may fairly anticipate much greater results from the introduction into China of western methods of production and transport than those which we have witnessed in India. It is therefore worth while to look at some of the geographical conditions that are likely to affect the ensuing development.

774. First, we must note that this development is sure to be to a large extent of an industrial character. The unutilised resources with which China is so lavishly provided are those which furnish the means for carrying on industries of the modern type. This must lead, as it has done in other parts of the world where similar favourable conditions exist, to a rapid multiplication of population on the coalfields. This population will be dependent on supplies of foodstuffs brought from elsewhere, probably from a distance, and it is extremely doubtful whether China itself will be able to meet this demand. The agricultural resources of China proper, if we may judge from the great density of the population,[2] would already appear to have been utilised to the

[1] Abundance of testimony could be adduced in support of this statement, and it may be worth while to quote the two following:—

'To crown all, there is to be noted, as the highest condition of successful trade, the evolution of commercial probity, which, though no monopoly of the Chinese merchants, is one of their distinguishing characteristics. It is that element which, in the generations before the treaties, enabled so large a commerce to be carried on with foreigners without anxiety, without friction, and almost without precaution. It has also led to the happiest personal relations between foreigners and the native trader. . . . Judicial procedure being an abomination to respectable Chinese, their security in commercial dealings is based as much upon reason, good faith, and non-repudiation as that of the Western nations is upon verbal *finesse* in the construction of covenants.'—A. Michie (long a member of the Shanghai Chamber of Commerce), *The Englishman in China*, i. pp. 264–5.

'The British banking institution which I have represented at Hong-kong for the last seventeen years has carried out with its Chinese constituents commercial and banking transactions aggregating the equivalent of many tens of millions of pounds sterling. Yet in connection with that enormous business, the bank has not sustained the loss of a single coin.'—T. H. Whitehead (Member of the Legislative Council, Hong-kong), *The Expansion of Trade in China* (a paper read before the Incorporated Chamber of Commerce of Liverpool, February 8, 1901), p. 27.

[2] The figures in n. 1, p. 399, give an inadequate idea of the extreme density of population in China. In one purely agricultural and quite typical district of

utmost. China already imports considerable quantities of rice, grain, and flour, and it is significant that these commodities are still admitted duty free.

774a. A disturbance of the present conditions of industry is certain to ensue, and this disturbance will be the greater the more rapidly the development goes on. Many countries are likely to be affected thereby, some in one way and some in another, and it is scarcely possible to foresee how far they are likely to be affected favourably, how far otherwise. But the greatest effects will be in China itself. There, with all the benefits likely to follow from the industrial development and the improvements in the means of communication, large numbers of the population are likely to undergo the same hardships and struggles as have been endured elsewhere, while old domestic industries were dying out and changes were taking place in the centres and routes of trade. It is probably the anticipation of this that has led to the provision for the taxation of machine-made products in China in the treaty of 1902.

774b. The countries and regions favourably situated for supplying the future industrial population of China with food-stuffs will no doubt receive an important stimulus to settlement and production. The already developed industrial countries of the world cannot fail to have some of their industries stimulated, and perhaps unduly, for some at least are likely to encounter at a later date severe competition in the country from which the stimulus proceeds. But that industrial China will ever overwhelm the world with its products, as some appear to think possible, is surely a vain alarm. 'People,' says Mr. H. Brenier, formerly director of the Lyons commercial mission to China, 'appear to think that we are going to put into the hands of the Chinese the powerful instruments of production which they lack, and that all the other conditions, which at present constitute a part of their advantages —low wages and a low standard of living, &c., will remain the same. That is opposed to experience.'[1] Efficient labour is indeed at present cheap in China, but its price is bound to rise when its total efficiency has been increased with the aid of machinery, just as surely as it has done in Japan,[2] and probably more rapidly. Details of life in China such as are given in the work already referred to (p. 403, note 2) make it hardly credible that improved means of production should not lead to the speedy growth of demands for a higher scale of living.

774c. Of the regions likely to be rapidly developed in the near future the most important is the coalfield of Shan-si, and it may be pointed out that if a railway through this coalfield were provided with northern connections, it is probable that a great deficiency among Chinese products would be supplied by a railway following this route. In

northern China (the less favoured part of the country) an enumeration was made of the population within a radius of three miles, and the result showed a density of more than 2,000 to the square mile. (A. H. Smith, *Village Life in China*, p. 19.)

[1] P. 252 of a paper on '*l'Illusion jaune*,' in *Annales de l'École Libre des Sciences Politiques*, Paris, 1898. [2] See p. 417, n. 2.

China proper there are very few sheep, and few animals of any kind yielding wool. Hence woollen garments are scarcely worn. But it must be remembered that the winter climate of a large part of China renders the use of warm clothing necessary. According to the present habits of the people, while cotton, China grass, or silk furnishes the material for the summer garments, the winter clothing of the rich consists largely of furs, that of the poorer classes of cotton padded and quilted. There can hardly be a doubt, however, that if woollen garments were sufficiently cheap they would form a suitable winter wear, and might in time come to be preferred to the padded clothes now worn. Now any northern branches of the railway at present under consideration would pass through a region thinly peopled indeed, but well adapted for sheep-rearing, and we have the example of Australia and the Argentine Republic (**205**) to show us how rapidly a large trade in wool can be developed under suitable circumstances by a scanty population. It is not unlikely, therefore, that the establishment of cotton-mills in the northern parts of China would be followed by the rise of woollen-mills, supplies of wool being obtained from the interior tablelands of Asia within the borders of the Chinese Empire. There is already a small but rapidly growing export trade from Tientsin in wool brought from Kansu, as well as across the mountain passes in the extreme north of China proper.

775. The nature of the foreign commerce is shown in the tables in the Appendix, but in comparing the earlier and later years it must be remembered that before June 1887 the trade carried on in native junks was not included in the returns. Nevertheless these tables reveal several significant facts. In the import trade one may notice particularly the absolute decline in the import of opium (due to the greater production of this drug in China itself) and the growth of a considerable trade in rice, sugar, coal, and woollens. In the export trade the most notable fact is the diminution of the export of tea (**270**).

776. The foreign trade is almost entirely carried on at certain **treaty ports**, which are the sole places at which foreign merchants are allowed to reside and own property, and foreign vessels allowed to load and discharge. Of these there are now upwards of thirty, the most important of which are underlined on the map. They now include all the chief seaports of China and most of the principal river ports, and a few inland places. The seaports are most numerous on the south-east coast of China, where the numerous indentations form a number of excellent harbours. By far the most important is **SHANGHAI**,[1] the great port of the Yangtse-kiang, the most extensive and productive natural region of China. Its importance is increased by the great lack of seaports in the part of China lying north of the

[1] Population, (?) 350,000.

Yangtse, the coast line there being mostly low and uniform, like that on the east of the Indian peninsula. The mountainous Shantung peninsula is indeed more favoured, but the harbours there are too far from any important hinderland to acquire any great trade with the imperfect communications at present in existence. In consequence of these conditions Shanghai serves as the great *entrepôt*, not merely for the minor Yangtse ports, but for all northern China. Shanghai lies, however, not on the Yangtse itself but on a small tributary known as the Wusung or Hwang-pu, at the mouth of which is a bar preventing vessels of more than 24-feet draught from reaching Shanghai even at high water spring-tides. Larger vessels are compelled to discharge at least part of their cargo at the town of Wusung. The port is provided with excellent graving docks, foundries, forges, machine-shops and engine-works under European management. The river ports of the Yangtse have their importance determined at present by the extent and productiveness of the hinderlands opened up by waterways, and from the structure of the country it is probable that the introduction of railways will not greatly alter their relative rank. **CHINKIANG** derives considerable importance from its situation near the junction of the Imperial Canal. But no river-port has, or can have, the importance of **HANKOW** or Hankau,[1] at which the waterways of western China converge in such a manner as to make it the inlet and outlet of Hunan, Sechwan, Kweichau, the greater part of Hupe, as well as of southern Shensi. The projected railways, it will be observed, tend to confirm the importance of this situation, but if Wuchang, on the opposite bank of the Yangtse, were also made a treaty-port, it is probable that after the introduction of railways the coalfields of Hunan would cause a very large part of the trade to be concentrated there. **SHASHI**, one of the more recently opened treaty ports, about midway between Hankow and Ichang, has the advantage of two important canal connections. One canal runs thence eastwards to the lower Han, thus avoiding a great bend of the Yangtse. The other starts from the point of the river Yangtse opposite, and leads to the Tungting Lake in Hunan. Shashi has thus long been the centre of an enormous traffic in native junks, and as the neighbouring country is the most important cotton-weaving district in China, the cottons are collected, graded, and shipped at Shashi in large quantity.

776a. Of the southern seaports the most important is **CANTON**,[2] the most populous town in China, with a situation analogous to that of Calcutta on one of the most productive of tropical deltas, with the advantage of having better communications by water in different

[1] Hankow is only one of three adjacent towns separated by rivers. Hankow is on the left bank both of the Yangtse and the Han, Hanyang on the opposite bank of the Han, and Wuchang opposite both on the Yangtse. This last is the seat of the viceroy of the provinces of Hunan and Hupe. The aggregate population of the three provinces is variously estimated at from 1,000,000 to 2,000,000.

[2] Population, (?) 1,600,000.

directions, but suffering from the great disadvantage of not being accessible to ocean ships of such large size as those which can reach Calcutta. All vessels drawing more than 16 feet have to lighten at Whampoa, fourteen miles below the port. Of the northern treaty ports **Taku**, the port of Peking, has a bar that prevents the access of vessels drawing more than 16 feet even at the highest spring-tides, and **TIENTSIN**[1] can be reached only by smaller coasting steamers. The importance of this place is due to the traffic on inland waterways. The same is true of **HANG-CHAU**,[2] the great silk-manufacturing town to the south-west of Shanghai. The bay on which it appears to stand can be navigated to its head only by small vessels, and the town is cut off from this bay by an embankment to protect it from the violent bores which ascend the bay at spring-tides. Of the four inland treaty ports near the southern frontier, **Lung-chau** and **Mengtse** have been opened to facilitate trade with Tongking, **Sumao** with Siam, and **Momein** or **Tengyueh** with Burma.

777. PEKING,[3] the capital of the Chinese Empire, occupies a site of strategic importance with respect to the routes leading into China proper by the Kalgan on the north-west and by the coast round the mountains on the north-east, but is situated on a plain far from productive, and consequently has a relatively small population. **SINGAN-FU**,[4] the capital of Shensi, near the right or south bank of the Wei-ho (tributary of the Hwang-ho), occupies a plain of much greater productiveness, and lies in a situation which makes it an important centre of convergence of the trade routes of China. It is, however, cut off from central China by mountains, across which the lowest pass is about 4,000 feet in height, which makes it doubtful whether future railway connections will follow the present route across these mountains. Of the inland towns of the Yangtse basin not treaty ports, the most important are Siangtan and Chengtu-fu. **SIANGTAN**[5] in Hunan is even more populous than **CHANGSHA**,[6] the capital of the province, situated lower down on the Siang-kiang. **CHENGTU-FU**[7] is situated on the margin of a small but carefully irrigated plain,[8] the most productive part of the highly productive province of Sechwan, of which it is the capital. Various schemes have been urged for getting access to this province by rail from Indo-China, but the routes are all extremely difficult. In this region a broken plateau, nearly conterminous with Yünnan and western Kweichau, 'having an average height of about 5,000 feet, and no communication by water with the plains that encompass it on the

[1] Population, (?) 1,000,000.
[2] Population, (?) 500,000.
[3] Population, (?) 500,000.
[4] Population, (?) 700,000.
[5] Population, (?) 1,000,000.
[6] Population, (?) 300,000. This is one of the ports which it is proposed to open under the treaty of 1902.
[7] Population, (?) 800,000.
[8] About 2,000 square miles in extent. See the sketch-map of the plain in *Geog. Journ.* xii. p. 232.

north, south, and east,' a plateau so broken as to have 'no level surface whatever, except an occasional lake basin,' extends for ten degrees of longitude between Indo-China and the Yangtse-kiang.[1] In these regions the three best routes have been examined by Europeans and declared virtually impracticable for railways, and there seems little probability that any one of them will be able to compete with a railway in the valley of the Yangtse-kiang.

778. Reference has already been made in pars. **697** and **716c** to the early relations of China with the west. In modern times the Portuguese were the first to establish direct trade relations with this country. This trade began in 1518, but encountered much hostility on the part of the Chinese. In 1557, however, they were allowed to settle on the island of **Macao** at the mouth of the Canton River, and in 1586 this island was definitely ceded to them in return for assistance rendered to the Chinese in putting down piracy. Both Portuguese and other foreigners were allowed to carry on trade at Canton, but under no formal treaty with the Chinese government before 1842. In course of time a large trade in opium grew up between India and China. This trade was contraband, and though the East India Company caused the opium to be grown expressly for the China market, it left to independent shippers the responsibility of introducing it into China. It was introduced by smuggling, which was corruptly connived at by Chinese officials. This state of matters was bound to lead to disputes, and ultimately it led to a war between China and Great Britain, at the end of which the five ports of Canton, Amoy, Fuchau, Ningpo and Shanghai were opened as the first treaty ports, and the island of Hong-kong, at the north of the entrance to the Canton River, was ceded to the British. The opium trade was still declared to be contraband, and another war broke out in 1857, at the conclusion of which it was for the first time legalised. More treaty ports were then opened, and every difficulty between the Chinese and European governments was made the opportunity for exacting the opening of further ports. In 1898 the Germans, on the occasion of a difficulty of that nature, demanded and obtained the cession 'on lease' of the harbour of **Kiauchou**, with a small district round it on the south side of the Shantung Peninsula; and this was followed by similar cessions to Russia of **Port Arthur** and the anchorage of **Talienwan** in Manchuria, to France of **Kwang-chau-wan** on the peninsula opposite the island of Hainan, and to Great Britain of **Wei-hai-wei** on the north side of the peninsula of Shantung. At the same time an addition was made to the **Kaulun** or **Kowloon** territory belonging to Hong-kong on the opposite part of the mainland. At the treaty ports the collection of the customs duties on behalf of the central government of China has long been in the hands of a

[1] Report by Mr. F. S. A. Bourne of a *Journey in South-Western China* (China, No. 1, 1888 [C.–5371]), p. 10.

foreign board called the Imperial Maritime Customs, presided over by an Englishman—a situation curiously analogous to that of the Staplers in past times in the trade of England (**529a**).

778a. Since its cession to Great Britain **Hong-kong** has become the great *entrepôt* for southern China, and nearly all the direct foreign trade with that country is tending more and more to become concentrated there and at Shanghai.[1] The deep and commodious inner anchorage at **Victoria Bay** on the north side of the island makes it the port for all large ocean-going ships in connection with the trade of Canton. Kiauchou Bay, though shallow in its upper parts, has a good harbour at **Chingtau** or **Tsintau** at its mouth, and the railway connections now being established will probably give it the necessary hinderland for the development of an important trade partly in competition with that of Shanghai (not of Hong-kong).

779. THE CHINESE DEPENDENCIES. China proper is bordered on the north-east, north, and west by various territories more or less directly under Chinese rule. **Manchuria** is the most important of these. It lies to the north-east, and is the country from which the present Chinese imperial dynasty originally came (in 1644). It has mountainous country in the east and west, the eastern mountains being rich in places in coal and iron. The intervening country, mostly level and to a large extent extremely fertile, is drained partly by the Liau-ho into the Gulf of Pechili, partly by the Sungari with its tributary the Nonni into the Amur—all fine navigable streams. Notwithstanding its fertility it is still comparatively sparsely peopled, especially in its middle and northern portions, where some of its most fertile tracts are situated. It is hence likely to be one of the chief sources of food-supply for some of the future industrial regions of China proper. Chinese settlers have long been flocking into it, and the works in connection with the Russian railways running through it (**702**) have recently hastened on this movement. Besides the capital **MUKDEN**,[2] there are several others—**Liauyang, Kwancheng-tse, Kirin**—estimated to have more than 100,000 inhabitants. **Tiehling** and **Tsitsihar** are at the head of navigation respectively of the Liau and the Nonni. The new towns growing along the railways under Russian auspices are all solidly built and provided with the latest conveniences of European cities. The most important of these is the new **Kharbin** or **Harbin** (a short distance from the old town of that name), situated where the railways diverge for Vladivostok and Port Arthur and Dalny, 'in a country as rich as Manitoba, with coal measures not far distant and forests near by.'[3] **Niuchwang** or

[1] On the present conditions of trade with China, the *Foreign Office Report, Annual Series*, No. 1909 (price 5*d*.), is peculiarly instructive.

[2] Population, (?) 300,000.

[3] The Peking correspondent of *The Times*, in *The Times* of January 14, 1903.

Newchwang is the treaty port near the mouth of the Liau. **Dalny** was at first a free port established by Russia in the leased territory adjoining Port Arthur, but in 1903 was placed under the Imperial Maritime Customs. This leased territory was transferred to Japan at the close of the war of 1904–5.

780. **Mongolia**, west of Manchuria, is a tableland occupied mainly by pastoral tribes, surrounding the **desert of Gobi**. **Maimachin**, long one of the chief seats of trade between China and Russia (**703**), lies on its northern frontier.[1]

781. **Chinese, or Eastern Turkistan**, occupies the basin of the Tarim, and is separated from Mongolia by part of the Chinese province of Kansu. It also is a tableland with a desert in the interior, but the **oases at the base of the mountains** which enclose the tableland are highly cultivated. The region has been so vividly described by a recent traveller that no apology is needed for quoting his words:—'If you could get a bird's-eye view of Chinese Turkistan,' he says, 'you would see a great bare desert surrounded on three sides by barren mountains, and at their bases you would see some vivid green spots, showing out sharp and distinct like blots of green paint dropped on to a sepia picture. In the western end, round Kashgar and Yarkand, the cultivation is of greater extent and more continuous than in the eastern half, where the oases are small and separated from each other by fifteen or twenty miles of desert. These oases are, however, extraordinarily fertile; every scrap of land that can be cultivated is used up, and every drop of water is drained off from the stream and used for irrigation.'[2] The height of the oases above sea-level is somewhat more than 4,000 feet.

Kashgar and **Yarkand** still maintain a caravan trade with China, and they are the centres of the trade carried on across the passes of the Pamir—a trade which was very valuable at the time when silk and other Chinese commodities were conveyed by that route to Europe (**697**).

782. **Tibet**, a lofty tableland, or series of tablelands, traversed by mountains, and bounded on the south by the Himalayas, is very scantily inhabited, and **most of the inhabitants are confined to the valley of the Brahmaputra** (**Sanpo**). It is tributary to China, but pays only a slight allegiance to the Chinese emperor. The actual ruler is the Grand Lama, the head of a peculiar form of the Buddhist religion. He resides at **Lhassa**, a town about 12,000 feet above sea-level. The country produces fine **wool**, including cashmere wool. In 1894 foreigners were allowed to advance as far as **Yatung** to the north of the Himalayan state of Sikkim for trade, but the trade with British India is nevertheless still small, Tibet continuing to derive the bulk of

[1] The projected railway drawn on the map at p. 404, as running through this province to Kalgan and Peking, is said to be actually in progress.

[2] Lieut. Younghusband, in *Proc. R. G. S.*, 1888, p. 498.

the tea it consumes in the form of brick-tea, carried by difficult routes from the west of Sechwan in China.

783. KOREA, the mountainous peninsula between the Yellow Sea and the Sea of Japan, like Tibet was formerly a loose dependency of China, but in 1895, after a war between China and Japan, was declared independent, but was never really so. From 1905 it has been practically under the control of Japan, which annexed it in 1910. Of the Korean ports opened to foreign commerce, the most important are **Chemulpo** on the west coast, **Wiju**, further north on the Yalu, **Ping-yang** (or Phyong-yang on the Tai-dong River in about lat. 39° N.), **Fusan** [1] on the south-east, and **Wŏnsan**, or Yuensan, on Broughton Bay on the east coast. Chemulpo is the port of the capital, **SE-UL**, or Hanyang, with which it is now connected by rail. Se-ul is now lit by electricity and provided with electric tramways. Several other treaty ports are now opened, and trade is rapidly increasing. Ginseng, a drug highly valued by the Chinese, is exported as a monopoly of the crown. The chief exports are, however, gold, beans, and rice. The production of raw cotton is increasing, and seems likely to increase still more rapidly. The chief imports are cotton piece-goods from England, America, and Japan, and cotton yarns mainly from Japan.

784. JAPAN is an insular empire embracing all the islands off the east coast of Asia, between the Philippines in the south and the peninsula of Kamchatka in the north. It thus includes **Formosa** (ceded by China in 1895), the **Riu-kiu** (Lu-chu) and **Bonin** islands in the south, and **Yezo** and the **Kurile** islands in the north[2]; but these are all to be regarded as Japanese dependencies, Japan proper being made up of the three main islands of **Honshiu**, Hondo or Nippon, **Shikoku**, and **Kiushiu**, between 41½° and 31° N., in a latitude accordingly corresponding to that of the eastern part of the Mediterranean region from the south of Bulgaria to the shores of the Nile delta. It is these islands that contain the great bulk of the Japanese population, and these only which are represented in the Japanese parliament. (See the diagrams, pp. 534–5.)

785. The entire group is **highly volcanic**, containing upwards of fifty active, besides numerous extinct, volcanoes. Like other highly volcanic regions it is much subject to earthquakes, which often do immense damage.[3] The **surface is extremely irregular**, and though the passes are low relatively to the height of many of the mountains the slopes are generally steep. This has proved a hindrance in the construction of railways. Not till twenty years after the opening of the

[1] Great harbour works are now in progress at Fusan, which since 1905 has been connected with Se-ul by rail.

[2] Since the treaty of September 1905, Japan also includes the southern half of the island of Sakhalin.

[3] In consequence of one earthquake in 1891, the traffic on the main line of railway from Tokyo to Kyoto was interrupted for five months.

first line of railway in the country (1872) were there two lines connecting opposite sides of the main island. Tokyo and Kyoto, only 230 miles apart in a direct line, are 338 miles from one another by rail. **Good roads scarcely exist.** One difficulty in the way of their construction and maintenance is presented by the character of the climate and the natural drainage. During the rainy season (39) the copious rains that deluge the mountain slopes cause frequent destructive floods on the banks of the numerous short rivers that descend on both sides. Almost all roads are then nearly impassable; moreover, **wheeled vehicles are comparatively rare.** Where they do exist they are generally drawn either by men or oxen. Goods are for the most part carried on the backs of men or the small native horses. The consequence is that the cost of transport is generally high, and in many parts puts a check upon production.

786. The **productive area** of Japan is limited by the very irregular character of the surface. Less than 30 per cent. of the surface is reckoned as productive, and **about 12 per cent.** (less than one-eighth) of the entire surface is **devoted to agriculture**; but as Japan lies, unlike the Mediterranean region, in an area of summer rains, it is enabled notwithstanding its severe winters to maintain on this relatively small area an extremely dense population.[1] All the plains and terraced mountain slopes are capable of yielding rice. By far the most densely-peopled area is that round the Bay of Ozaka, together with the strip stretching westwards along the north shore of the Inland Sea and the valley running north from Ozaka to Kyoto.

787. Besides rice, the principal food-crops are **wheat, barley** and **soya-beans. Mulberries**, from which are obtained the principal export product of the empire, silk (220), are planted in more than three-fourths of the provinces, everywhere in rows, allowing of space for other crops between. **Tea**, prepared for export as green tea, is grown chiefly between lat. 34° N. and 36° N.; that is, in the south of Honshiu; and the **lacquer-tree** (*Rhus vernicifera*, DC.), that is, the tree that furnishes the material employed in lacquering, one of the most celebrated of old Japanese industries, is cultivated mainly in the northern part of the same island, between 37° and 39° N. **Camphor,** which forms one of the more important among the minor exports of Japan, is also one of the ingredients used in the art, since that substance serves as a diluent for the lacquering material.

788. Japanese agriculture leaves little room for live stock. Sheep have only recently been introduced in small numbers experimentally. The number of horses is about a million and a half, that of cattle one million, as against nearly two millions of the former and upwards of ten millions of the latter in the British Isles, which have a rather smaller

[1] At the end of 1898 the population was equivalent to a density of about 380 per square mile in the main island, and upwards of 400 to the square mile in each of the two smaller islands to the south.

population. Japan is thus altogether without, or very poorly supplied with, some important products. It has **no native wool**, no milk, butter, or cheese, and a comparatively **small supply of leather**, which has to be replaced for different purposes by various other materials (437).

789. Of the **minerals** of Japan the most important is **coal**, the production of which is rapidly increasing. On the island of **Yezo** alone the area of coal is two-thirds as much as the area of coal of equal thickness in the British Isles, and a railway has been laid for the purpose of bringing the coal to the coast. Still more favourably situated are the coal-mines in the north-west of **Kiushiu**, near Moji, and the south-west of the same island, at and near Nagasaki. The **iron** ores of Japan are for the most part not easy of access, but with the view of making itself independent of foreign supplies for defensive purposes the Japanese government has spent more than two millions sterling in establishing iron and steel works at **Wakamatsu** on the north coast of Kiushiu, at the western entrance to the straits of Shimonoseki, within twenty miles of both coal and iron mines. **Copper** and **antimony** are among the Japanese exports. The copper ores of **Ashio** or Ashiwo, near Nikko north of Tokyo, are of high grade, and are now produced in large amount. The production of **silver** is also important. Abundance of **kaolin** furnishes the raw material for the ancient and celebrated porcelain industry of the country.

790. In all departments of Japanese industry human labour is assisted only by the most **primitive tools and appliances**. In agriculture even the plough is rarely used. The deep and careful tillage of the ground is effected by means of the spade and other hand implements; and where the plough is used, it is an implement that merely scratches the surface, and is incapable of making anything like a furrow. No carts are used in farming, not even the Chinese barrow. Everything is carried. A primitive hand-mill is the only apparatus used for grinding flour. Flour is, indeed, not much used. Bread was unknown till it was introduced by the Portuguese, and even yet is made only to a very limited extent in the form of cakes. All kinds of manufacturing industries were till recently almost entirely domestic, as they still are mainly, some kind of handicraft being practised in nearly every Japanese household.

791. Great changes have, however, been brought about, in consequence of a change in the attitude of the Japanese government towards the civilised nations of the west. The Japanese then began to show great eagerness to learn from western nations. European languages (especially English) were taught in their schools. Foreign teachers of science were employed in their colleges and the university of Tokyo; Japanese students were sent to Europe and America for education. Railways and telegraphs and modern textile and other machinery were introduced. Native coalfields were developed with the aid of steam and electric power. Foreign trade was encouraged. At first this trade was

limited to certain treaty ports, where alone foreigners were permitted to reside, but where they enjoyed certain privileges. The first three of these were thrown open in 1858. At last, on July 17, 1899, the whole country was thrown open to foreigners to settle in and establish industries if they pleased; but the privileges referred to were withdrawn. Resident foreigners were required to submit themselves to the Japanese law-courts like natives, the Japanese codes of law having meantime been more or less assimilated to those of Europe. Previously, in 1889, the government had been made a constitutional limited monarchy.

792. The first native steamship company was established in 1874. Magnificent Japanese vessels are now seen in all waters, and since the inland navigation of Chinese rivers was thrown open to foreigners, the Japanese have been acquiring a larger and larger share of the trade.[1] **Machine cotton-spinning factories** have been established with great success, chiefly since 1882. The subsequent history of this industry is considered in the Introduction to the Fourth Edition of this work, par. 18. Cotton-weaving mills have followed. In Japan, as in China, winter garments are often padded, but among the upper classes, and even among the richer tradespeople, the use of European **woollen garments is coming** more and more **into favour,** and continued efforts are being made to establish woollen manufactures with modern machinery in the country. **Paper-mills** of foreign type have also been set up (**443**); and a striking illustration of the power of Japan to compete with Europe in manufacturing industry has been furnished in the match trade. **Japanese matches,** made by foreign machinery, are now supplanting Swedish in China, and even in Siam and the Straits Settlements. Japanese exports of all kinds are increasing rapidly. It is significant that among the most rapidly growing imports are sugar, flour, beans, peas and other articles of consumption, besides woollens. Wages have also risen considerably,[2] and though prices of commodities have generally also risen they have not risen in the same proportion.

793. Nearly all the chief towns of Japan are seaports. **TOKYO,**[3] the present capital, is, however, accessible only to ships of small size, and its port is **YOKOHAMA.**[4] which has a safe harbour for vessels of any

[1] The rapid growth of Japanese shipping, favoured, it may be observed, by the growing exports of Japanese coal and imports of food-stuffs and other bulky produce, as well as by Government subsidies, is shown in the table on p. 617. In his annual report for 1907 the chairman of the P. and O. Company stated that the Japanese have ousted them from the inter-colonial trade between Bombay and Japan.

[2] In making such comparisons the changes in the value of money have to be taken into account. Till October 1, 1897, the standard currency of Japan was a silver yen; since that date it is a yen on a gold basis divided into 100 sen. The gold yen is equal to 2*s.* 0½*d.* (roughly 10 to 1*l.*). In 1885 the average value of the yen was about 75 per cent. greater than it is now. In that year the average daily wage of a male weaver in Japan was 0·125 yen = at the present value of the yen 0·219 yen, in 1899 the wage was 0·411 yen; in 1885 the wage of a joiner was 0·226 yen = at present values 0·395 yen, in 1899 it was 0·568 yen.—*Financial Annals of Japan*, No. 1 (1901).

[3] Population, nearly 1,500,000.

[4] The European consuls reside at the neighbouring town of Kanagawa.

size. **OZAKA**,[1] the largest town in southern Japan and the chief seat of the cotton-spinning industry, which is here favoured by the abundance of labour and the extent of the local market, suffers from the same drawback as Tokyo, but **KOBE**[2] or **HYOGO**, eighteen miles distant on the same bay, has an excellent harbour. **KYOTO**,[3] the old capital of Japan, lies inland about twenty-five miles from Ozaka and seven miles from Lake Biwa. **NAGOYA**,[4] at the head of the Owari Bay to the east, is an important manufacturing and commercial town noted for its porcelain and other artistic products, but is not accessible to sea-going ships owing to the silting up of the upper part of the bay. **NAGASAKI**, on the other hand, on the south-west coast of the island of Kiushiu, has an excellent harbour, and is now much frequented as a coaling station and has a large export of coal. It has large graving docks, a patent slip, and a shipbuilding yard with the most improved appliances capable of building two vessels 600 feet long and two 800 feet long at one time, machine-shops, boiler-works and foundries, and a technical training-school in connection with these establishments. Deshima, an artificial islet close to Nagasaki, was the seat of a Dutch factory or trading-station as far back as 1641. **Niigata**, the principal port on the west coast, has its shipping stopped for half the year by the strong surf that beats along the whole of this flat and dangerous coast during the prevalence of the winter monsoon.

793*a*. Hakodate, on Tsugaru Strait, in **Yezo**, has only a small foreign trade. This large island, though said to have 25 per cent. of its surface fit for agriculture, has a severe climate, and at present has only a scanty population on the coast, chiefly engaged in fishing (salmon, herring, cod), though there is now, as already intimated, also a mining population. The island is now officially known as the Hokkaido, or Northern Colony, and the Japanese government is endeavouring to develop its resources.

793*b*. Formosa is traversed from north to south by a range of mountains which, along with the eastern plain, are inhabited by a semi-barbarous people. The inhabitants of the western plain are mainly of Chinese origin, but not of a high type. The chief exports are tea and camphor, the latter a government monopoly. The capital is **TAIPEI**, near the northern end, connected by rail with the port of **Kilung** or Kelung, which has an excellent anchorage, and near which are mines of good soft coal capable of being mixed with Welsh coal for use on steamers. Improvements are projected on the harbours of **Anping** and **Takau** on the west coast to promote the sugar industry, which is carried on in the neighbourhood.

[1] Population, above 800,000.
[2] Population, above 200,000.
[3] Population, 350,000.
[4] Population, 250,000.

AFRICA

794. This continent, though not the least populous either in respect of the absolute number of the estimated population or the average density, is that which is of **least importance** as regards its contribution to **external commerce.** This is due partly to natural unproductiveness, which does not favour density of population over any large area; partly to the backward state of civilisation; and in particular to the fact that throughout a large part of the interior population and production are kept down by **misgovernment, internal wars,** and, above all, the practice of **slavery**; partly to the fact that in no other continent have European influences, and especially European modes of production and transport, made so little headway.

795. The natural **unproductiveness** of the continent is in a large measure attributable to the **want of rain.** Africa lies as a whole in latitudes where the atmosphere is always able to retain large quantities of vapour uncondensed. Its **surface,** like that of Spain, is made up mainly of **plateaux** with bordering mountains, so that the interior is in most parts reached only by winds that have been deprived of the greater portion of their moisture. The only regions with fairly abundant rainfall are certain parts of the equatorial region, narrow strips on the east and south-east coast, and part of the north coast in the neighbourhood of the Atlas Mountains. There are vast regions in the north-east and south-west entirely desert, or nearly so, except where capable of irrigation. The only district possessing a really high density of population is a small part of Egypt, in the north-east.

COUNTRIES AND REGIONS OF AFRICA

796. EGYPT. This country is nominally a part of the Ottoman Empire, but it has an independent government, which is at present practically under the control of Great Britain.

The country extends from the mouths of the Nile to Wady Halfa, in about lat. 22° N. In the east it extends to the Red Sea, and includes the peninsula of Sinai; and in the west the boundary is an indefinite line passing through the great Libyan desert. The **habitable area,** however, is almost confined to the tract capable of being irrigated by the waters of the Nile—that is, to the **Nile delta, and a valley, varying from two to fifteen miles** in width, lying between deserts on both banks of the Nile. Hence, though the distance in a direct line from Wady Halfa to the shore of the Mediterranean is about 680 miles, equal to the distance from the Scilly Isles to the northern extremity of the Shetland Islands, the entire **area fit for cultivation is less than 9,000 square miles,**[1] or about one-half larger than Yorkshire; and on this area is crowded a population of about 10,000,000, almost wholly dependent on agriculture.

797. What renders this **highly-productive agriculture** possible is the regular **annual rise of the Nile**—a rise now known to be due to the summer (monsoon) rains (39) on the Abyssinian mountains. The river begins to rise about the 26th of June. It grows turbid and red with the fertilising mud which it carries in suspension. By the month of September it has reached the top of its banks and begins to overflow, except where restrained by artificial dykes. A normal rise at Cairo is about 25 feet; if the rise exceeds 27 feet there is danger to the embankments, and day and night these are watched by the able-bodied male population, ready to fortify or heighten them under the direction of engineers. The labour required for the maintenance of the irrigation works was formerly exacted from the people by the government.

798. **In Upper Egypt,** that is, **from the southern frontier to Siut** (Assiut), in about 27° N., the sole method of irrigation practised till supplies of water were made available in summer by the Aswan dam was

[1] Before the opening of the Aswan dam (801*a*), the total area paying full taxes was 7,328 square miles, besides which there was a partially reclaimed area of 1,656 square miles, paying proportional taxes. The settled area, including rivers, canals, roads, &c., is about 13,000 square miles.

the old method of the Pharaohs, the method described by Shakespeare in the words which he puts into the mouth of Mark Antony—

> They take the flow o' the Nile
> By certain scales i' the pyramid; they know,
> By the height, the lowness, or the mean, if dearth,
> Or foison, follow. The higher Nilus swells,
> The more it promises: as it ebbs, the seedsman
> Upon the slime and ooze scatters his grain,
> And shortly comes to harvest.

The scales or gauge by which the rise and fall of the river are measured are not, it is true, in the Pyramids, but otherwise this description is as accurate as it is graphic, and it is only necessary to add that the country on both banks is divided up into basins by embankments reaching to the hills on both sides, that these basins are gradually filled through canals and sluices, and then emptied at the end of a period of seventy days or so. By this method of irrigation the soil is condemned to sterility for half the year, during which it is either under water or baked to a degree of hardness which makes it impossible to grow anything. By it, too, only such crops can be grown as ripen within a short period—beans, lupines, clover, lentils, wheat, barley, onions.

799. The more valuable crops, **cotton, sugar-cane, maize, millet, dates, rice, &c.**, require higher temperatures, and some of them a longer period to mature, and hence in Egypt **demand a system of perennial irrigation**—that is, a system by which water can be supplied all the year round. On a small scale this has been done within the town enclosures on the banks of the Nile and its deltaic arms from ancient times downwards by means of apparatus for raising water from the river; but on a large scale it can be done only with the aid of perennial canals. This system, in which high embankments are erected to confine the river in flood, and high-banked canals to conduct the water to the irrigable basins, has been practised on a large scale only since the first half of the nineteenth century, and is still confined to **Lower and Middle Egypt**—that is, to the delta, and the region between the delta and Siut. A portion of Middle Egypt is still irrigated on the old system. The importance of perennial irrigation in Egypt will be appreciated from the following example of a typical deltaic three years' rotation. Cotton is grown from March to the end of October, and is immediately followed by clover, of which seven cuts are taken. In the next eighteen months from July onwards two crops of maize and one of wheat may be reaped, the wheat being grown in the winter and spring. The second crop of maize may be succeeded by clover, of which two cuts can be obtained before the ground is cleared once more at the beginning of March for cotton. The importance of this system of irrigation is enhanced by the fact that some of the summer crops of Egypt are of exceptionally high value.

800. Besides the land immediately adjoining the river, Middle Egypt includes in its productive area a detached district known as the **Fayum**, which lies to the west, a little above the head of the delta. For three thousand years this district has been fed with water by the **Bahr Yusuf**, a channel led from the Nile a little above Siut. The Bahr Yusuf[1] is 270 miles in length, and is also employed in irrigating the basins along its route. In the course of the nineteenth century another canal, called the **Ibrahimiye Canal**, starting at Siut, was constructed for the irrigation of Middle Egypt, and it is from the upper part of this canal that the Bahr Yusuf is now directly supplied.

801. The full supply of water obtainable from a normal rise of the Nile is required for the area of land already under cultivation in Egypt, and famine is threatened to a greater or less extent both when the rise is exceptionally low, and when it is so high as to overtop the artificial embankments and thus destroy the crops growing under their protection. The regulation of the river thus requires the constant attention of the government. At the head of the delta there exist vast works to control the level of the river, and since the government of the country has been under British influence (since 1888) these works have been greatly improved. Anglo-Indian irrigation engineers succeeded in rendering efficient what is known as the barrage, a pair of dams with sluices on the two main arms of the Nile delta a little below Cairo, and thereby the whole of the delta and the part of Egypt to the north-east of Cairo and the south of Zagazig have been made independent of the state of the Nile. In Upper and Middle Egypt also the system of basin irrigation has been improved by arrangements allowing of the water in basins belonging to a group in one part of the Nile valley being supplemented in a low flood by canals led from the next group higher up. Of the result of such improvements the most striking indication perhaps is that afforded by the increase of population. A census taken in May 1882 returned a population of 6,817,000, that of June 1897 one of 9,734,000, showing an increase at the average rate of 2·4 per cent. per annum—a rate unparalleled in any other old country whether agricultural or manufacturing.

801*a*. The figures just given will enable one also to appreciate the importance of the great dam at **Aswan** (Assuan) opened in December 1902, and the subsidiary dam lower down at Siut. Between November and April the sluices of the Aswan dam will be closed to such an extent as to allow of the accumulation of the Nile water above, in the form of a lake reaching about two hundred miles up. At the beginning of May 1,065 million cubic metres of water will thus be rendered available for irrigation, by means of which it is expected that about 70,000 acres in Upper Egypt, 52,000 acres in the Fayum, and 120,000 acres in Lower Egypt will be irrigated for the first time; and that 458,000 acres in

[1] River of Joseph. Its construction is popularly attributed to Joseph the Israelite.

Middle Egypt and 85,000 acres in the province of Gizeh (adjoining the delta on the west) will be converted from basin to perennial irrigation. The Siut dam is to supply water to the Ibrahimiye Canal in spring and summer. In March 1903 another dam was opened at Zifte on the Damietta arm of the Nile about midway between Cairo and the sea, and in February 1909 another at Esneh about 100 miles north of Aswan.

802. The Nile, besides being the great means of irrigation, is of importance as a waterway. It is **navigable without impediment as far as the Aswan dam**, where a lock allows of vessels ascending to the 'second cataract' at Wady Halfa. At high water this rapid can be navigated easily enough, but higher up there are many other obstructions to navigation. From the western of the two chief arms of the Nile in the delta a navigable canal, the **Mahmudieh Canal**, about ten feet in depth, proceeds to Alexandria; and **another canal** proceeds eastwards from the important town of **Zagazig**, on one of the minor arms of the delta, to the Suez Canal, and sends a branch southwards from **Ismailia** to **Suez**. It is likewise joined by a canal from Cairo. The **Suez Canal** lies entirely in Egyptian territory. The **railways** of Egypt (map, p. 364) are unfortunately on two gauges, those below Luxor in about 25½° N. on a broad gauge, and those above that point on one of 3 feet 6 inches. There are also numerous light agricultural railways.

803. The nature of Egyptian **commerce** is shown in the tables in the Appendix. The bulk of the foreign commerce is concentrated at **ALEXANDRIA**,[1] the ancient port at the north-western extremity of the Delta. **Port Said**, at the northern end of the Suez Canal, is a great coaling-station, and has a large *entrepôt* trade in eastern commodities. Minor ports are **Rosetta** and **Damietta**, near the mouths of the arms of the Nile which take their names from these towns. Bars obstruct the mouth of the river at both places. The capital is **CAIRO**,[2] at the head of the delta. Its suburb of Bulak is a busy river-port.

804. In the desert belonging to Egypt, west of the Nile, there are several **oases**, each with a few thousand inhabitants. The most important are **Siwah** (ancient Jupiter Ammon), to the south of the Libyan plateau in the latitude of Fayum, and **Khargeh**, in about 25½° N., which was connected by rail with the Nile valley in 1908.

804*a*. Reference has already been made (**716*a***) to Egypt as a transit land in the lucrative trade carried on between the shores of the Indian Ocean and the Mediterranean. The frankincense of Hadramut (**716*c***) passed this way at a very remote date, and so also did ivory, precious stones, spices, and other valuable commodities from tropical Africa and the east. Different routes were used for reaching the Nile valley, but one seems to have been much frequented in many periods of history and even in prehistoric times. It is that which connects the modern port of **Kosseir** on the Red Sea with **Koft**, the ancient *Koptos*,

[1] Population, 320,000. [2] Population, 570,000.

situated on that part of the Nile where the river approaches nearer to the sea than anywhere else in Upper Egypt. A trough sunk in the desert, though at an elevation much above that of the Nile valley, connects the two places, and has favoured the sinking of wells. It is believed by Mr. Wallis Budge that it was probably by this route that the people who founded the oldest known civilisation of Egypt entered the country. The port of Kosseir was known to the ancient Greeks as *Leukos Limen*, afterwards translated by the Romans into *Albus Portus* (white harbour). By many scholars this port is believed to have been the *Myos Hormos*, from which in the days of the Roman Empire the Indian fleets regularly set sail at the time of the summer solstice.

804*b*. Since the re-conquest of the **Egyptian Sudan** by British and Egyptian forces in 1896–99 the whole of the Nile region as far as Uganda has been regarded as a joint dominion of England and Egypt. The northern part of this region is entirely dependent on irrigation. Occasional rains occur in thunderstorms about the confluence of the Blue and White Nile, and higher up the rains become more prolonged and abundant as one goes to the south. To the south of 10° N., in the region traversed by the White Nile and the Bahr-el-Ghazal with its numerous tributaries, plentiful summer rains convert the low plains bordering these rivers into extensive swamps, and form a great lake known as Lake No at the confluence of the two main streams. The low plains adjoining the rivers are very unhealthy, but healthier tracts at a higher elevation intervene. At present almost the only commercial products of this region are ivory and rubber, but there are vast areas capable of producing cotton, oil-seeds, indigo, and other tropical products, the chief impediments to the commercial production of which are the defective means of communication and the lack of labour. Samples of cotton of exceptionally high quality grown in this part of the Sudan have reached England.[1] The navigation of the Nile in the Egyptian Sudan is impeded by four cataracts, or series of cataracts, between the northern frontier and Khartum, and above Khartum it is liable to be interrupted by accumulations of matted vegetable matter known as *sudd*. A navigable channel has, however, been cleared through the sudd to Uganda, in which the Nile is navigable to Fort Berkeley in about 4° 40′ N., a little above Lado. The Bahr-el-Ghazal and its tributary the Bahr-el-Arab are navigable to Meshra-er-Rek in about 8° 20′ N. **Khartum**, the capital of the province, situated at the confluence of the White and Blue Niles, has since the end of 1899 been connected by rail with Wady Halfa, but further railways are required for the development of the resources of the region.[2] Khartum, which

[1] These, however, were exceptional. The cotton of the Egyptian Sudan is generally of inferior quality.

[2] A railway from Berber on the Nile below Khartum to Port Sudan (formerly Sheikh Bargut) about 30 miles to the north of Suakim or Sawákin was opened in January 1906, and a little later another railway was opened from Abu Hamed, where the railway which crosses the desert from Wady Halfa rejoins the Nile in about 19° 20′ N., to Karema, a point on the right bank of the Nile below the third cataract. The fertile province of Dongola is thus brought into communication with the sea.

was captured from the Mahdi along with the adjoining town of Omdurman on the left bank of the White Nile in 1898, is being rebuilt as a European city. Soon after its capture a college, to be known as the Gordon College, was founded here to be the means of introducing western science among the people. The chief product found on its market at present is gum from Kordofan.

805. WESTERN MEDITERRANEAN STATES.—A. The vast area, mainly desert, between Egypt and Tunis forms the Turkish province of **Tripoli.** It includes, besides Tripoli proper, the oases of **Fezzan** (the chief of which is **Murzuk**), to the south of Tripoli proper, and the plateau of **Barka**, with a small strip of cultivable land east of the Gulf of Sidra. The navigation along the coast (700 or 800 miles in length) is dangerous on account of the numerous sandbanks and the want of harbours. **Tripoli** is the only seaport of consequence, and is the **centre of a caravan trade** across the Desert of Sahara. Its only important exports of local origin are alfa or esparto grass (**199**) and sponges (**358*a***). A small trade is carried on at **Bengazi**, the port of Barka.

806.—B. Algeria and Tunis. The former has been a **French colony** since 1830, the latter a **French protectorate** since 1881. Both are traversed by parallel chains of the **Great and Little Atlas**, but the principal cultivated area has a different relation to these mountains in the two dependencies. In Algeria the region best fitted for cultivation is a strip of lowland, or land at moderate elevation, between the coast and the Little Atlas, a strip known as the **Tell**; and the region between the Great and Little Atlas is a plateau producing little besides **alfa** grass. **In Tunis** the chief area of cultivation is a valley between the two chains of the Atlas, namely, the **valley of the Mejerda,** a river which regularly overflows its banks during the winter **rains** (**39*b***), irrigating and fertilising the neighbouring plains. The climate and products of both Algeria and Tunis are similar to those of southern Italy and southern Spain. In both **wine** is a product of growing importance and great promise (**183, 186**).

806*a*. Since the occupation of **Algeria** by France, repeated efforts have been made to increase the French element in the population by the planting of colonies. Land confiscated from the native Arabs and Berbers (Kabyles) has been granted to the colonists on varying terms, and villages have been erected for them in many parts of the country. The results have not been altogether satisfactory. The French form only a small proportion of the population, and are out-numbered by Europeans of other origin (Spaniards, Italians, and Maltese). French rule has, however, done much for the development of the resources of the colony, though at a considerable annual cost to the mother country. Thousands of miles of **excellent roads** and many hundreds of miles of **railway** have been made. Harbours have been constructed. New land has been brought under cultivation by the sinking of **artesian**

wells (62). The region south of the Atlas, the Biled-ul-jerid, or Land of Dates, is largely occupied by nomadic Arabs; but here, also, date-planting has been greatly increased by artesian wells, as on the Wed Rirh between Biskra and Tugurt. Far to the south the oases of Wargla and Golea also belong to Algeria.

806*b*. The **rising exports** of Algeria are **wine, sheep, and wool, early potatoes** (which now cover about a third of the cultivated area, and are nearly all exported to France), grapes and other fruit, tobacco, and olive oil. In the exports to the United Kingdom from both Algeria and Tunis **alfa grass** takes the first place; but the trade in this article has been considerably affected by the increasing use of wood-pulp in paper-making (437). The minerals as yet of great commercial importance are the **iron ore** obtained from the mines of **Ain Mokhra**, in the east of Algeria near the port of Bona, and those of **Benisaf** in western Algeria (see map, pp. 828-9), and phosphate rock and zinc ore in Tunis. In **Tunis** the **forests** on the hill slopes north of the Mejerda are rich in cork-oaks, and another species of oak which has a valuable tanning-bark. They hence promise to be of increasing commercial value. At present the leading exports from Tunis are olive oil and cereals (wheat and barley). The bulk of the Algerian exports go to France, those of Tunis to Italy. The United Kingdom supplies a large proportion (in the case of Tunis the largest proportion) of the manufactured goods which form the chief articles of import into both regions.[1]

806*c*. The principal **ports** of Algeria, in the order from west to east, are **Oran, Algiers, Bougie, Philippeville** (the port of Constantine), and **Bona**. Most of the ports of Tunis are only open roadsteads. The town of **TUNIS**, the most populous town either in the protectorate of Tunis or Algeria, and the chief seat of the foreign commerce of the protectorate, is situated **at the end of a very shallow lagoon**, and vessels formerly had to load and discharge in the **roadstead of Goletta**, at the narrow mouth of this lagoon, but a canal through the lagoon 21 feet in depth now allows large vessels to reach the town. **Susa, Sfax**, and **Cabes** or Gabes, on the east coast, are the ports chiefly frequented in the commerce with the interior of Africa, inasmuch as caravans that ascend the valley of the Mejerda are obstructed on their way southwards by the **shotts**, or string of shallow salt lakes, that extend for about two hundred and fifty miles inland, to the south of the mountains. These shotts lie below the level of the Mediterranean. It has been proposed to let in the waters of that sea to cover the depression which they occupy; but the project has been abandoned as unlikely to prove remunerative. On the north coast, a

[1] After the establishment of a preferential tariff in favour of French goods in 1898, the value of British exports to Tunis at first declined, but they have since recovered. The principal British exports to Tunis are cottons and coal; among those to Algeria coal is by far the most important, machinery coming next.

strong naval station has been formed by the French at **Bizerta** at the mouth of a lagoon.

807.—C. Morocco is a Mohammedan empire in the north-west of Africa. It includes, as a loose dependency, the oases of **Tuat** in the south-east, which are separated by upwards of one hundred miles of desert from the nearest cultivable parts of Morocco proper. The surface of Morocco proper is highly mountainous. The **High Atlas** traverse the country from south-west to north-east, and are connected at the north-eastern extremity with a coast range known as Er Rif. The chief permanent rivers of the country flow through the lowlands and plains in the angle between these ranges, and in that area lie also the chief towns—**Morocco** (the present capital) in the south, and **FEZ** and **Mekinez** in the north. All of these lie at the base of the mountains (39), the western plains being extremely arid. **South of the Atlas, the rivers**, such as the Wady Draa, are **temporary**, containing water in their lower courses only when the snow is melting on the mountains.

807*a*. In relation to foreign commerce Morocco can be described only as a country of possibilities. The government, till recently one of the most fanatical in the world, regarded all Christian nations with aversion, and even disdain, and these feelings are still cherished by the great body of the people. Foreign commerce consequently is in no way encouraged, and the export even of some of the most valuable commodities (such as esparto grass) is kept down by high export duties. There are **no railways, no wheeled carts, no internal navigation.** All goods have to be carried on the backs of animals, chiefly camels. There are **only two tolerable ports** opened to European trade—**Tangier**, on the Strait of Gibraltar, and **Mogador**, the port of Morocco, in the south. Among the **minor ports, Rabat** has a good river harbour, but obstructed by a bar; **Saffi**, only an open roadstead. The harbour of **Tetuan**, on a river entering the Mediterranean, requires to be cleared of sand. Of all the ports, Tangier is the most thriving. Being the residence of the chief representatives of foreign powers, it is the place where there is most security for Christians. It is, indeed, the only place in the empire in which Christians are allowed to acquire land and house property.

807*b*. In consequence of all these hindrances, the whole annual value of the foreign commerce of this country, with about 9,000,000 inhabitants, is under 3,000,000*l*. (imports and exports combined). Such **foreign commerce** as does exist is **mainly with England and France**, and is carried on chiefly through the intervention of native Jewish merchants. Germany is making great efforts to acquire a larger proportion of the trade. The chief **exports** are **maize** and other grains, **wool, oil**, and other agricultural products; but some native manufactures, such as **fez caps and leather (432)**, are exported to various **parts** of north Africa.

807c. With regard to the possibilities of Morocco, it must be mentioned that the country has a soil luxuriantly fertile, **rivers well adapted for irrigation**, and, it is believed, **great mineral wealth** (notably rich copper deposits in the south). Even internal navigation by means of the rivers is practicable. By dredging, it is said, the river Sibus might be made navigable as high as Fez.

808. BRITISH SOUTH AFRICA. British territory now extends from the south coast to Lakes Nyasa and Tanganyika, but with an inverveming Portuguese wedge on the lower Zambezi. It thus includes, besides the Union of South Africa, a state formed in 1910 by the union of the former self-governing colonies of the Cape of Good Hope, Natal, the Orange River Colony and the Transvaal, which now form provinces of the Union with self-government in local affairs, the Bechuanaland Protectorate, Basutoland, the vast territory of Rhodesia, and the Nyasaland Protectorate.[1] The seat of the legislature of the Union of South Africa is Cape Town, that of the executive government Pretoria.

809. Of this area the part to the south of the Zambezi has so much in common in the character of the physical features and the climate and the circumstances determining the economic development, that it will be convenient to take a preliminary general view of that portion, apart from the area to the north of the Zambezi, even though that river divides the territory of the British South Africa Company.

810. Throughout British South Africa the rise of the surface from the coast to considerable altitudes in the interior is rapid. From the western half of the south coast the ascent is made in well-marked terraces, the innermost of which form tablelands of 3,000 feet or more in height. These tablelands are known by the Hottentot name of Karroos. The **Great Karroo**, which has a length of nearly three hundred miles from west to east and a width in many parts of seventy miles, lies between the Nieuweld Mountains and the Sneeuwbergen (Snow Mountains) in the north and the Zwartebergen (Black Mountains) and Outeniqua Mountains in the south. Its altitude gradually varies from under 2,000 feet in the west to above 2,500 feet in the east. To the south of it, in the west, lies the **Little Karroo**, which is drained from the west and east by the two headwaters of the Gouritz River, which finally escapes southwards through a notch (in Dutch *kloof*) in the Langebergen (Long Mountains).

810a. On the eastern side the rise in terraces is not so well

[1] In 1903 a convention representing all the territories of British S. Africa agreed to adopt a uniform customs tariff, with a preference in favour of commodities grown, produced, or manufactured in the United Kingdom in the case of all goods on which duties were imposed at an *ad valorem* rate, such goods including the most important British imports. On certain classes of goods a rebate of 25 per cent. on those of British origin is allowed; and on goods liable to an *ad valorem* duty of 2½ per cent., in the case of British imports the duty is wholly remitted.

marked, or at least not so regular. Here the main feature is the Drakenberg[1] (Dragon Mountain) Range, which may be said to begin in the south in the Stormbergen (Storm Mountains) to the north-east of the Sneeuwbergen, and then run east and north parallel to the coast. They are the highest mountains in South Africa, and descend inland to plateaux of more than 7,000 feet in altitude in Basutoland. The passes leading across them from Natal to the Orange River Province and the Transvaal are at the height of 5,500 feet and upwards. Still further north the higher mountains and tablelands of British South Africa, such as the Matoppo Hills in Matabililand, are all towards the east.

811. Together with the physical features just described, the circumstance of most importance in determining the character of the climate of British South Africa is its situation between the trade-wind belts of the Indian Ocean and the South Atlantic; but it is to be carefully noted that a small portion in the extreme south-west receives winter rains from anti-trades. In the rainfall diagrams on p. 21 the curves for Durban and Loanda may be taken as more or less typical for the greater part of the region, and that of Cape Town for the extreme south-west. Loanda, however, shows a much greater rainfall than is to be found anywhere on the west side of British South Africa except in the extreme south (39*b*). The **karroos are subject to prolonged droughts**, which cause them at times to present the appearance of hard, burnt-up deserts; but, on the other hand, they are occupied by a vegetation singularly adapted to a climate of this nature—able, that is to say, to survive, though in a withered condition, the want of rain for months, and even years, so that in a week or two after the occurrence of rains the surface becomes green with herbs and bushes or richly coloured with multitudes of flowering plants. In such a climate, however, cultivation, and even the rearing of live-stock, are obviously impossible without **irrigation**. Throughout the greater part of the north-west of the Cape Province the annual rainfall is altogether insignificant. On a narrow strip of the south coast rains are fairly equally distributed all the year round, but the predominance of summer rains illustrated by the rainfall curve for Durban is the prevailing characteristic of eastern South Africa generally, owing to the fact that at that period an area of low barometric pressure in the interior greatly strengthens the trade-winds of the Indian Ocean and draws them powerfully inwards. Except in the extreme south it is only that part of South Africa that has a sufficient rainfall to support agriculture. In one point, however, the curve for Durban is typical only for limited areas in the interior of South Africa. That curve shows a high rainfall throughout the summer. In a valuable report[2] made

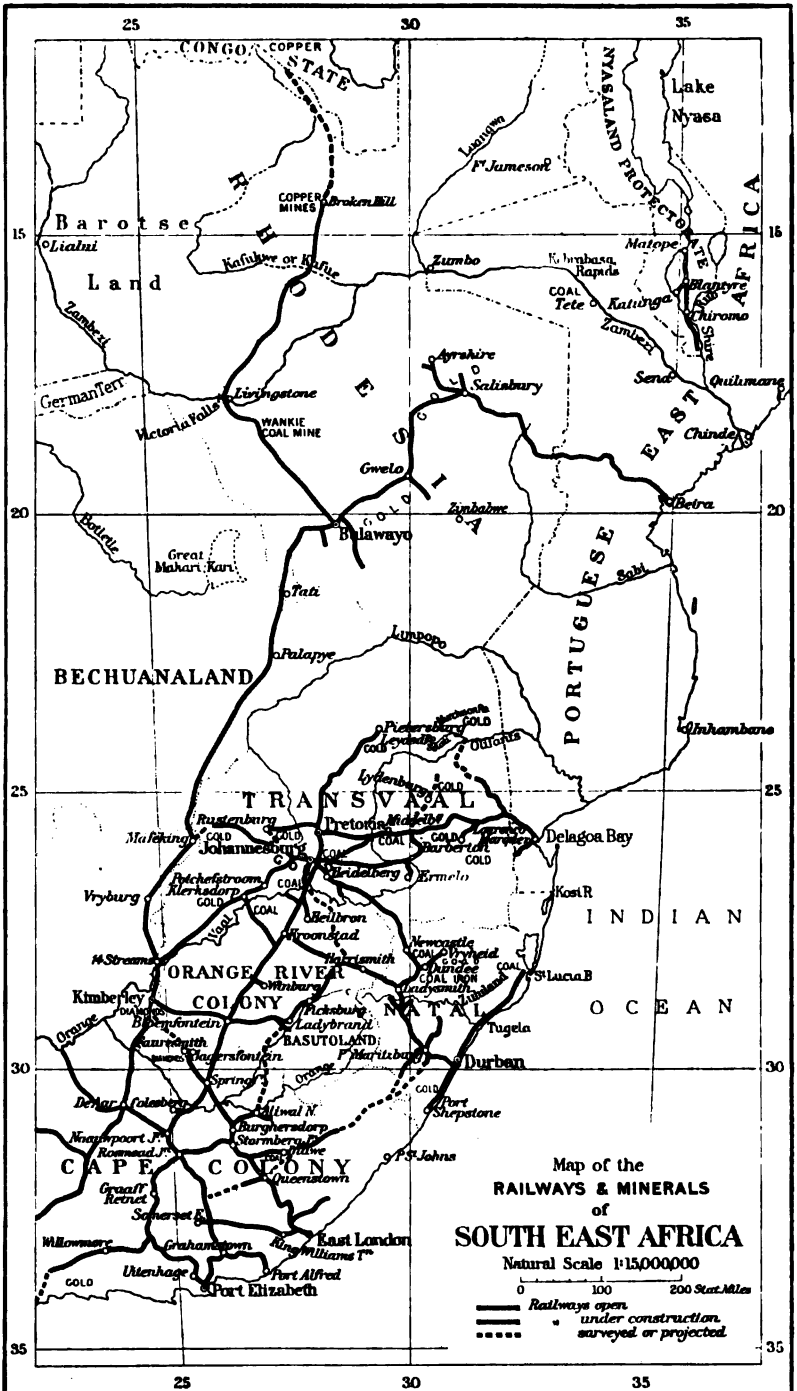
[1] Not Drakensberg. The interpolation of the *s* in English books and newspapers is originally due to carelessness.
[2] Published in *Further Correspondence relating to Affairs in South Africa* [Cd. 1163], 1902.

in 1901 at the instance of Lord Milner by Mr. (now Sir William) Willcocks, attention is called to the extremely important fact that in the greater part of South Africa it is only the rains at the end of summer culminating in February and March that fall with a fair amount of regularity and abundance. As this period of the year, in consequence of the high altitude and consequent rarity of the atmosphere, is immediately followed by a rigorous winter, those rains are useless for sowing. Accordingly only in a few parts sufficiently near the Drakenbergs to get rains in August and September can wheat be grown without irrigation. Sown at the time of those rains it is reaped in December. (See, however, what is said as to dry farming in par. 54*b*, p. lii.) Maize and a few other crops suited to warm rainy summers can be grown more widely.

811*a*. The rivers of South Africa being mostly fed only by summer rains have the characteristics belonging to all tableland rivers in countries with alternating rainy and dry seasons. They flow in valleys deeply cut below the general surface of the country and having a width and slope varying with the nature of the rock in which they have been cut. In summer they are in flood, in winter they are mostly reduced to tiny threads, which in some parts trickle between heaps of boulders filling a wide bed bordered by high bluffs. The **Orange**, though longer than the Rhine, is navigable for boats only a few miles up. Even the east side of British South Africa is practically without navigable rivers.

812. So long as the development of South Africa was dependent solely on agriculture and pastoral industries the character of the climate confined the bulk of the inhabitants to the eastern side. In the latter part of the nineteenth century the discovery of valuable minerals, diamonds and gold, led to a much more rapid development, and these were also found on the eastern side. The diamond-fields of **Kimberley**, discovered in 1867, were the cause of the first long railway being built into the interior. A greater stimulus to railway construction was given by the discovery of the goldfields of the Rand in the southern Transvaal and the subsequent foundation of Johannesburg in 1886. For all these reasons it is only on the eastern side that there is a network of railways.

812*a*. The character of the coast-line as well as the superficial configuration have influenced the direction of the railways, and on all the lines into the interior the geographical features have necessitated the resort to heavy gradients. South Africa is almost entirely wanting in good natural harbours, and the points capable of being made convenient for shipping are at great distances from one another. In False Bay, east of the Cape Peninsula, there is an admirable naval station at **Simon's Town**, but that is not so situated as to be suitable for a commercial harbour. **Cape Town** is 428 nautical miles from **Port Elizabeth**, this port 131 miles from **East London**, and this again 253 miles from **Durban**, and Durban 300 miles from **Lourenço Marquez** in Portuguese territory



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on Delagoa Bay; and these are the only ports at which it has been so far found worth while to provide accommodation by harbours or even long piers for the large ships of the present day. Strong currents on the south-east coast are constantly causing the accumulation of sediment, which powerful suction dredgers are required to remove. The strong south-easterly summer winds often prevent large ships from lying alongside the ends of the piers that have been constructed at **Port Elizabeth**, and naturally more frequently by day than by night, when the rarefaction on the land is less and the indraught from the sea diminished. **Saldanha Bay**, about one degree north of Cape Town, forms an excellent natural harbour, but lacks a hinderland so long as it remains unconnected with the Cape railway system.

812*b*. All the South African railways are on the gauge of 3 feet 6 inches. The following table gives the distances by rail from the chief ports to the interior and the time taken by different routes between Johannesburg and the seaboard:—

Distances in Miles by Rail

—	Cape Town	Port Elizabeth	East London	Durban	Lourenço Marquez	Beira
De Aar Junction	502	338	—	—	—	1,537
Kimberley	647	485	—	—	—	—
Bulawayo	1,361	1,199	—	1,854	—	678
Salisbury	1,659	1,497	—	—	—	380
Bloemfontein	750	449	401	—	—	—
Johannesburg	957[1]	714	666	483	396	—
Pretoria	1,001[1]	740	692	511	349	—
Barberton	1,284[1]	1,023	975	794	136	—
Time by Rail in Hours						
To Johannesburg	47	37	84⅕	27	24	—
From "	45¾	34	33½	—	—	—

Greater distance is, however, in some cases partly compensated by easier gradients. A large proportion of the Natal railways have a gradient steeper than 1 in 35, and there are many curves of 300 to 350 feet radius. The line from Durban to Johannesburg, after ascending within sixty miles to above 3,000 feet, descends nearly 1,000 feet to Maritzburg, then in twelve miles climbs to 3,700 feet, and about fifty miles further on is at a height of 5,150 feet. The Orange River Province branch ascends by steep gradients the whole way from Ladysmith (3,280 feet) to about 5,500 feet in Van Reenen's Pass. The line from Cape Town has curves as sharp as those on the Natal line, but the steepest gradients are from 1 in 40 to 1 in 45, and the highest altitude south of the Orange River is under 4,300 feet. On the line inwards from Port Elizabeth a gradient of 1 in 40 is necessary before Grahamstown is reached. The highest altitude on that line (near Naauwpoort) is just

[1] By Fourteen Streams.

under 5,200 feet, and that on the East London route nearly 5,600 feet (three miles beyond Cyphergat). On the Delagoa Bay line the great rise is within the Transvaal. Belfast, where the Ermelo line branches off, is 6,560 feet above sea-level, and in the 105 miles to the east of that there is a rise of 5,190 feet, equal to an average of 1 in 107. The sharpest rise is, however, from twenty to thirty miles east of Belfast, where there is a rise of 680 feet in about four and a-half miles, equal to about 1 in 35. On this section a rack-rail is employed.

812*c*. Such physical conditions of necessity greatly diminished the value of the natural resources of South Africa and retarded their development; but the great value of the minerals holds out the prospect of more rapid development in the future. The local markets furnished by the gold and diamond fields may be expected to add greatly to the value of less costly minerals, such as coal and iron, found in convenient situations in the interior of South Africa, and the development of these will still further extend the local market for agricultural products, and thus make remunerative works of irrigation which otherwise could not have been carried out at a profit. One promising sign is that South Africa has begun to ship (1907) thousands of tons of maize to Europe. For a clue to the degree in which the maritime states share in the trade with the interior, see p. 602.

813. **The province of the Cape of Good Hope**, formerly known popularly as The Cape Colony, embraces all South Africa to the Orange River and Natal, and in middle longitudes extends beyond the Orange to the Molopo. This last section comprises the territory of Griqualand West with the diamond fields of Kimberley and Beaconsfield, and the territory which till 1895 formed the Crown Colony of British Bechuanaland. The province also possesses the whaling station of Walvisch Bay on the west coast of German South-west Africa, about one degree north of the Tropic of Capricorn. The population is mainly to be found in the east and on a narrow strip of the south coast, a necessary consequence of the facts already mentioned. More than three-fourths are coloured—Kaffirs forming the most numerous section, with a few Hottentots and Bushmen in the west, as well as immigrant Malays and others. The white population is mainly of Dutch, Huguenot, or British descent, and English and a corrupt Dutch are the principal languages.

813*a*. The Dutch first occupied Cape Town in 1652 as a half-way house on the route to their settlements in the East Indies. The French Huguenots came as refugees in 1688 after the revocation of the Edict of Nantes. They soon amalgamated with the Dutch, adopting their language, French being used for the last time in a church service in 1724. These two elements formed the peasant population known as Boers (farmers). The colony was twice occupied by the British during the Napoleonic wars, the second occupation taking place in 1806, since which date the colony has been a British possession. The most impor-

tant British settlement made in the colony was that which was established in 1819 at Port Elizabeth on Algoa Bay, which has ever since been the chief British stronghold. The British and Dutch sections of the population have never properly amalgamated, which is partly due to the difference of occupation, partly to inconsiderate treatment of the Dutch in early days by the British home government. The Dutch are mainly farmers, the great majority pastoral farmers scattered over the country in farms of 2,000 to 6,000 acres or more in extent. The British are mostly traders living in the towns. As regards the government the Dutch complained chiefly of two things—first, that the government would neither defend them against Kaffir raids nor allow them to defend themselves, and second, that when their Kaffir slaves were liberated in 1834 the compensation offered was quite inadequate, and the manner in which it was given very prejudicial to the Boers. The proportion of British and Boers among the white population has never been ascertained, but it is certain that the Boers form the majority. It is usually said that the coloured population is increasing more rapidly than the white, but this is not borne out by the returns of the successive censuses.

814. Only a small proportion of the surface is adapted for agriculture. In the western half of the province irrigation is absolutely necessary for the growing of crops, except in a small district round Cape Town where most of the products of the Mediterranean can be grown. In the eastern half larger areas have a sufficient rainfall for agriculture, especially south of the Stormbergen and Drakenbergen, but these are mostly in the hands of coloured natives, who grow maize (mealies) and other grains adapted to warm rainy summers. Sir William Willcocks estimates that about 1,000,000 acres are capable of being added to the irrigated area.[1]

814*a*. The pastoral industry has from the first been of much more importance than the growing of crops in the colony. At first only cattle and the native sheep were reared, the latter an animal yielding excellent mutton but only a coarse kind of hair rather than wool. The merino sheep was introduced about 1812, and after that wool came to be the most important export of the colony. Among exports originating within the province it is still the next in importance after diamonds. The sheep are reared partly on grass on the coast strip, partly on the karroos, where they depend chiefly on a deep-rooted bush known as the karroo bush. In the arid western parts of the Great Karroo, from eight to twelve acres are required on the average for the support of a single sheep, but in the eastern parts only three. Hence it is from the eastern ports, Port Elizabeth, East London, and Port Alfred, that the great bulk of Cape wool is exported. **Uitenhage**, not far

[1] Preparations are now (1903) being made for irrigating 16,000 acres on the banks of the Orange River in the Colesberg district to the south of the Orange River Colony. A peculiarity of this scheme is that all profits above 5 per cent. are to be devoted to the requirements of the settlers.

from Port Elizabeth, is the great wool-washing centre of the province. **Graaff Reinet**[1] is the chief centre of the most productive pastoral area of the eastern karroo. Besides sheep and cattle, the Angora goat has been largely reared since about 1840 and the ostrich since about 1865. **Oudtshoorn**, a rich irrigated district in the western part of the Little Karroo, has extensive fields of lucerne (**472**) entirely devoted to the rearing of ostriches.

814*b*. The **diamond fields** of Kimberley have been actively worked since about 1869. The industry is now controlled by a few capitalists, who regulate both the methods and the amount of the production. Kaffir labourers are hired for terms of three months, during which they are never allowed to leave the works, where they live in enclosures known as compounds. The diamonds are found in a hard earthy matrix known to the miners from its colour as 'the blue.' Copper and coal are at present the only other two minerals of economic importance in the province. Copper is obtained in the nearly rainless district of the north-west, at the mines of **O'okiep**, whence the ore is conveyed by a mule railway to **Port Nolloth** for export. The coal production of the province is still small, but is increasing. The chief mines are at **Indwe**, on a branch railway running about sixty miles east from Cyphergat, about the highest part of the line from East London to the interior. The quality is not good, but the supply is of some importance for the neighbouring districts, including the southern part of the Orange River Province.

815. In the parts of the province beyond the Great Kei river, known as the **Transkeian Districts**, which now (since 1894) include Pondoland, the white population is very scanty. Here the mouth of the **St. John's River** forms an exceptionally good harbour. The want in this case is a hinderland.[2] The Drakenberg Range prevents this harbour from being a means of access to the interior, and no commercial products of any importance are as yet to be got from the forests sparsely sprinkled with Kaffir kraals.

815*a*. **Bechuanaland** is a vast territory to the north of the Orange River and Griqualand West. It has a narrow strip adapted for maize and other cultures in the east, but in the west is mainly composed of the so-called **Kalahari Desert**, where the rainfall is very scanty, though there is much underground water, and where there is only a very small and scattered population of **Bushmen**, living as hunters. The part to the south of the Molopo and Nosob rivers or water-courses, with the towns of **Vryburg** and **Mafeking**, formed a part of Cape Colony from 1895. The remainder is a British Protectorate with **Palapye**, the residence of the leading Bechuana chief, as its capital.

816. **Natal** is a province with local self-government, extending from

[1] Accent on the second syllable.

[2] Proposals are now being made for opening up this region by a railway.

the Cape Province to Portuguese East Africa and the Transvaal, and separated from Basutoland and the Orange River Province by the Drakenberg Range. From the Transvaal it is separated mainly by the Pongola river, the territory of the former colony having been extended. As its surface rises rapidly in elevation from the coast to the interior, its climate may be said to change from sub-tropical to temperate in the same direction. Near the coast are grown sugar-cane, cotton, tea, arrowroot, and other tropical and sub-tropical products, and sugar is an important export. Further inland are grown the temperate cereals, and sheep and cattle are reared. **Wool is the chief export**, but it is largely of external origin. Here also there is a large and rapidly increasing native population, mainly Zulu Kaffirs, who form the majority of the inhabitants, not only in the former Zululand north of the Tugela and Buffalo (annexed to Natal in 1897), but also in the former Natal. There are also above 100,000 Indians, originally introduced as coolie labourers on the tea and other plantations and as miners, but many of whom have remained as market gardeners and traders. The chief towns on the Natal railway system have already been mentioned (812*b*). **Durban**, the chief seaport, has a fine natural harbour, **Port Natal**, the entrance to which, formerly barred, has been so cleared by powerful dredgers that in 1906 the average low-water depth was 31 feet. **Maritzburg**,[1] the capital, though at an altitude of 2,200 feet, is situated amid scenes of tropical beauty indeed, but in a hollow in which the heat is oppressive. In the extreme north of the province **Newcastle** and **Dundee** are rapidly increasing their production of coal, which is better than that of the Cape Province, and, in spite of the long haul of 206 to 268 miles over the difficult railway route above described (812*b*), is now largely exported by sea and made use of as steam-coal by ocean liners. This is one of the regions of South Africa where the goldfields are expected to promote the speedy development of an iron industry, for immense deposits of good iron ore are said to lie in the immediate neighbourhood of the coal. A fruit trade (in oranges, grapes, as well as the fruits of a cooler climate) is also expected to be developed in the uplands along the railway route. **St. Lucia Bay**, the only important indentation of the coast in northern Natal, is worthless as a harbour. (See also par. 56.)

817. Basutoland is a British crown colony almost entirely inhabited by a Bantu people of Bechuana stock. It consists of plateaux from 5,000 to 7,000 feet in height, sloping southwards and westwards from the Drakenberg range, diversified by valleys, in some cases steep-sided, in others with gentle slopes. It has in most years a sufficient rainfall for the cultivation of wheat and other temperate crops, sown in July or August and reaped in December.

818. The Orange River Province, situated between the Orange and Vaal rivers, is a former Boer republic annexed by the British in 1900.

[1] The original full name Pietermaritzburg is now rapidly dying out.

The population is made up of much the same elements as that of the Cape Province. The surface is typical veld country, rolling grassy plains seamed by river beds of the kind described in par. 811*a*. The plains vary from under 3,500 feet in height in the west to about 5,500 in the east. The greater part of the colony has a rainfall inadequate for agriculture without irrigation, but the part in the south-east, known as the Conquered Territory,[1] forming the western half of the Caledon valley where that river forms the boundary between Basutoland and this colony, has generally a sufficient rainfall in early summer to allow of wheat cultivation (811). The rainfall is also supplemented by numerous springs. This tract is universally considered the best in South Africa for European settlers. The north-eastern districts of the colony lack these August-October rains, but on the other hand have abundant rains from December to March, and are thus well adapted for the cultivation of maize. Sir William Willcocks estimates that 750,000 acres in the colony are capable of being irrigated with advantage. Among the minerals of the colony are diamonds in the south-west at Jagersfontein and Koffyfontein, and coal in the north at Kroonstad. The capital is **Bloemfontein**, situated, as shown on the map of South-east Africa, on the direct railway route from Port Elizabeth to Johannesburg and Pretoria.

819. **The Transvaal**[2] is another former Boer republic annexed by the British in 1900. In Johannesburg and the Rand generally (that is, the great gold-mining district in the south) the majority of the white population is of British origin, but outside of the gold district the population is mainly Dutch, being descended from Boers who emigrated from the Cape Province in bitter discontent with British rule. The surface features are similar to those of the Orange River Province, but here the geological structure, even apart from the mineral wealth, is of great importance. Sir William Willcocks divides the territory into five regions. The most important is (1) the **Dolomite Region**, forming the middle section of the southern part stretching from the Vaal to the parallel of Pretoria. Dolomite is a rock composed of carbonate of lime and magnesia, subject like limestone generally to be hollowed out by the action of rain-water. It is thus rich in caves, which store up and ultimately discharge water in perennial springs, in sufficient abundance to supply not only the present great demands of the Rand, but also in all probability the much increased demands of that district in the future, and to leave a large surplus for the irrigation of cornfields, orchards, tobacco-plantations, and gardens. (2) The **High Veld** lying to the east of the Dolomite Region, composed of undulating grassy plains at an altitude of 4,700 to 5,700 feet, with very cold dry winters, but with a rainfall from January to March rendering it suitable for the cultivation, without irrigation, of maize, potatoes, and other roots, as well as of pulses, though these last are at present neglected. (3) The **Bush Veld** north

[1] Because conquered from the Basutos.

[2] Population, census 1904, 1,354,000 (300,000 whites).

of the dolomite region, and (4) the **Low Veld** to the east, in both of which the plains are generally below 3,000 feet in height, and hence, being in a latitude below 26° S., not well adapted for European settlement. Both are traversed by comparatively high ranges of hills. Farmers migrate (trek) from the High Veld to the Low Veld on account of the dying down of the grasses on the High Veld in the winter. (5) The **South-western District**, an arid and comparatively unproductive region. Sir William Willcocks estimates that about 500,000 acres in the high-lying tracts where Europeans can live and work and 1,000,000 acres in the low grounds are capable of being irrigated with advantage.

820. The **mineral wealth** of the Transvaal is enormous in amount and varied in character. The first place belongs to **gold**, which is found in paying quantity in many parts of the country. The deposits first exploited were those of the **De Kaap** field in the east, in which the town of **Barberton** was founded in 1885. But this and all other deposits have been rendered of quite minor importance since the discovery, about the same time, of the goldfields of the **Rand** (Witwatersrand). On the richest part of the Rand the town of **Johannesburg** was founded in September 1886, and at a census held in 1896 the population of the town and district was found to have grown to upwards of 100,000, of whom about half were whites. The Rand is a ridge about sixty miles long, rising about 1,000 feet above the adjacent country. The gold-bearing rocks are a conglomerate, in which the gold occurs in the form of minute particles more or less evenly disseminated through it. Hence powerful machinery is required for its extraction, and from the first this has been a capitalists', not a poor man's, goldfield. Naturally every effort has been made to develop the field with the utmost rapidity. The chief difficulty consists in devising means for attracting labourers on the terms most profitable to the owners of the mines.[1] In 1888 the total production was 208,000 ounces; in 1898, the last year before the war, it was 3,823,000 ounces.[2] The principal other goldfields of the Transvaal are those of **Malmani** in the west, **Pietersburg** in the north, and the **Zoutpansberg** district in the north-east.

820a. The Transvaal is also rich in other minerals. **Coal** has been mined almost since the foundation of Johannesburg at Boksburg, a short distance to the east. It occurs in greater abundance at Middelburg, and not far off there is said to be a great abundance of excellent

[1] After the war native labourers were slow in coming in to work in the mines, and in the spring of 1904 the number engaged was still below what it had reached before the war, in spite of all the efforts made by the mine-owners. The majority of the mine-owners having declared that it was impossible to work the mines by white labour, a convention between the British and Chinese Governments, setting forth the conditions under which indentured labourers might be imported from China into any British colony or protectorate, was signed on May 13, 1904. Under this convention many thousands of Chinese coolies were introduced into the Transvaal mines, but these are now being gradually repatriated.

[2] Fine gold; in 1903, 2,973,000; in 1907, 6,451,000; in 1908, 7,056,000.

iron ore in the Ermelo district. The valuable local market at Johannesburg may accordingly be expected to stimulate the rise of an iron industry in the near future.

821. **RHODESIA**, extending northwards from the eastern part of Bechuanaland and the Transvaal to the Congo Territory, was brought by treaty within the sphere of British influence in 1888. Most of that part of it which lies south of the Zambezi, even though it reaches far within the Tropic of Capricorn, may be included in temperate South Africa, inasmuch as it embraces a large extent of tableland from 4,000 to 5,000 feet in height, with tracts healthy for Europeans. The higher parts of the tableland are in **Matabililand** in the south round the Matoppo Hills, a district taking its name from a warlike tribe of the Zulu family which once held sway over a vast area round about, and in **Mashonaland** in the north, a district named after a peaceful industrial tribe formerly subject to the Matabili. The British South Africa Company, which obtained a royal charter in 1889, here has its principal field of operations. The charter empowers the company, among other things, to acquire rights of government, but reserves to the Crown the right of assuming dominion if it sees fit. The first settlement made by the company was at **Salisbury** in Mashonaland. In 1894 a war with the Matabili led to the occupation of their territory by the company, and there a well-built town now takes the place of the former Matabili capital of **Bulawayo**, which since 1897 has been connected with Cape Town by rail (812*b*). In the higher parts of the region the rainfall is fairly plentiful, and even European crops are grown with success. Gold exists at many places,[1] and its production is rapidly increasing.[2] The **Wankie** coalfield (see map, p. 431) is said to contain coal little inferior to that of Cardiff. The **Victoria Falls**,[3] not far off, where the Zambezi, a mile wide, plunges a height of 343 feet into a narrow gorge, must some day afford enormous water-power.

822. North of the Zambezi lie the administrative divisions of **North-western** and **North-eastern Rhodesia**, which are in great part separated by the Kafukwe or Kafue river.

North-eastern Rhodesia has been divided into several districts, and contains a number of stations with good brick and iron buildings; among these, **Fife** on the Stevenson Road, connecting Lakes Nyasa and Tanganyika, and **Abercorn** at the south-east end of Lake Tanganyika. The copper mines shown on the map near the route marked out for the 'Cape-to-Cairo' railway appear certain to become of great value. Good cotton has been grown in this division. **North-western Rhodesia** is still mainly under native rule, but two British district officers have

[1] Ancient ruins show that gold was worked in this region at some remote period. The most remarkable of these are the Zimbabye or Zimbabwe ruins, about 180 miles due east of Bulawayo.

[2] Gold produced in 1898, 16,378 ozs.; in 1903, 231,872; in 1908, 606,961.

[3] The railway was opened to the Victoria Falls in June 1904, and a bridge 650 feet long was completed in the following year.

been appointed, one for the Batoka district in the south-east and one for the Barotse district to the north-west. The chief settlements of the **Barotse** (capital **Lealui**) are in a low-lying, marshy, and unhealthy but fertile valley on both banks of the Zambezi, where that river flows from north to south, a valley about 150 miles in length by 25 in width, annually inundated during the rainy season, which lasts from the end of November to March or April. Iron ores of high quality abound in this and the neighbouring valleys.

823. West Africa between the Cape Province and lat. 18° S., with the exception of Walvisch Bay (**813**), is under German protection. At present this region has hardly any commercial products, but it is well adapted for cattle-rearing. Arid as the climate is, the underground stores of water are said to be very abundant. Walvisch Bay is the best natural outlet for the territory, but an independent harbour has been formed at **Swakopmūnd**, a little to the north, and a railway made thence to **Windhoek** in the interior, near which copper is known to exist in considerable quantity. Cotton of very high quality, of long and very fine staple, has been grown on the route of this railway. Copper also occurs at Otavi, in the north of the territory.

824. TROPICAL AFRICA. This is the part of the continent that yields least to commerce, and most of it affords little prospect of yielding much more in the near future. **Oil and oil-seeds, ivory, rubber, gums, and spices make up the bulk of the exports** from these regions, and the total value of them, especially of the last two, is insignificant. These products, moreover, are largely, if not mainly, obtained by the system known to the Germans as '**robber-economy**,' the system that destroys what furnishes the product, so that one has to penetrate to a greater distance inland in search of commodities of which the regions first visited have been denuded. The regular cultivation of products for export is confined to very limited areas.

825. The causes of this state of matters are various. In the first place, there is only a comparatively **limited area in which there is a strong settled government.** The most conspicuous exception to this general statement is that offered by the native states between the Niger and Lake Chad, more particularly the great Hausa states of **Sokoto, Gandu, and Adamawa,** as well as **Bornu.** More or less civilised communities have existed there for hundreds of years, though the Fula dynasties now reigning in the Hausa states have held sway there only since the beginning of the nineteenth century. Their sway is vigorous, but till the British intervened (**834**), its advantages were greatly reduced by the fact that it countenanced slave-raiding. You might travel, according to Mr. J. Thomson, as safely through the Hausa states as through Great Britain. Throughout the region the climate is, for Africa, eminently healthy. The air is dry and exhilarating, though the temperature is high. The soil is much more fertile than is commonly the case in Africa. The rains are adequate.

The fields are consequently well cultivated, and produce abundance of durrah (299), maize, cotton, and other crops. The horse, camel, ox, and donkey flourish. There are large towns, with a population in some cases of as much as 150,000. The people are expert in many handicrafts, including the working of brass and other metals. They are fond of voluminous garments, and delight in adorning even their horses with silks and velvets, tassels, and tinkling bells.

825*a*. Here it may be noted that these states are all Mohammedan, and that it is apparently since the introduction of **Mohammedanism** that the civilisation just described reached its present stage of development. Mohammedanism has, in fact, hitherto proved the most powerful civilising agent in central Africa. Its influence is still spreading, and it has already conquered the whole area from the Atlantic to the Indian Ocean as far as 6° N. lat., and in some parts even farther south.

826. On the other hand, the **slave-trade**, as practised at the present day by the Arabs, the people among whom Mohammedanism arose, is perhaps the chief hindrance to the establishment of settled government in central Africa, and the **second great obstacle to the development of trade** with that region. Throughout the greater part of this region Arabs carry on the **trade in ivory and the trade in slaves hand in hand.** They go wherever ivory can be accumulated, and when they have collected their store of this valuable commodity they seize or purchase natives to serve as bearers, and finally to be sold as slaves.

827. Thirdly, the **climate** of central Africa is an obstacle to its development. The climate, like that of all tropical regions, is enervating and unfavourable to labour. On all the lowlands **malaria** prevails, and it is not even absent from the tropical plateaux. Among Europeans this causes an appalling mortality, and even natives do not escape it.

828. Fourthly, the **soil** of central Africa is generally **far from fertile.** Large areas of the plateau of eastern Africa are hopelessly barren. The fertile volcanic soil in the neighbourhood of Mounts Kenya and Kilimanjaro, east of Lake Victoria Nyanza, is quite an exception, and even there the country is burnt up for eight or nine months in the year. Vast areas in the Congo basin and elsewhere are covered with that insatiably thirsty soil known as laterite (52).

829. Fifthly, the **means of communication** with the interior are very **defective.** On the north, the great desert of Sahara intervenes between the Mediterranean and North Atlantic seaports and the Sudan, and in the east there are deserts of greater or less width everywhere north of the equator, between the coast and the more fertile highlands of the Nile basin.

829*a*. The navigation of nearly all the great rivers is interrupted by rapids and falls. Above the limit mentioned in par. **804*b*** the **Nile** navigation is interrupted for more than a degree of latitude before Lake Albert Nyanza is reached, and long stretches of the Victoria Nile between the Victoria and the Albert Nyanza are also unnavigable.

The lower half of the **Senegal** is navigable for gunboats, but the upper half is obstructed by numerous difficult rapids, some impassable for the greater part of the year. The unbroken navigation of the **Niger basin** is of much more importance than that of any other African river except the Nile, regard being had to the situation of the most productive regions belonging to it. Vessels of 600 tons can ascend for seven or eight months in the year as high as **Rabba**, a little above the confluence of the Benue. There navigation is almost wholly interrupted[1] by a long series of rapids, and even above those rapids the navigation is very difficult as high as about 15° 40′ N., but above that point the Niger is navigated for hundreds of miles by large and swift canoes manned by from forty to fifty men. The **Benue**, the great tributary of the Niger, which traverses the southern part of the Hausa states, is **navigable to about 13° E.**, that is, for nearly the whole of its westerly course. The **Congo** has nearly 1,000 miles of uninterrupted navigation between the outlet of Stanley Pool, about 300 miles from its mouth, and Stanley Falls, situated just above the place where the river first crosses the equator, but on the **200 miles next below Stanley Pool numerous rapids and falls** completely obstruct the navigation. The great tributaries on its left bank all have their navigation stopped in the same way between about 5° and 6° south; and the **Mobangi**, the most important tributary on the right bank (now proved to be the lower course of the Welle), has somewhat difficult rapids in 4° 20′ N. The **Zambezi**, the only great river on the east side of the continent, not only has **impassable rapids in its lower course** (about the place where it turns to the south-east), but till quite recently it was not known to have any mouth without a shallow bar. The **Shire**, the tributary on the left bank which forms **the outlet of Lake Nyasa, has its navigation interrupted by a cataract** about midway between the lake and the Zambezi, and is navigable only by boats drawing no more than 18 inches—the largest of about 40 tons burden.

830. Roads fit for wheeled vehicles, and railways, are only beginning to be introduced into central Africa. The only means of carriage left in the greater part of this region is thus pack animals and human carriers. The established routes of central Africa, though forming an intricate network connecting every village, are hence mere beaten tracks of small width.

831. The beasts of burden most in use are the camel, the indispensable carrier of the desert, and the ox. A **camel caravan** (89) takes about three months to cross the Sahara by the shortest and easiest route from central Sudan to the Mediterranean—that, namely, by the oases of Fezzan to Tripoli. The average rate is thus about fifteen to eighteen miles a day. A **caravan of human porters**, where this method of carriage is best organised, as in Portuguese Africa on the west coast

[1] The whole length of these rapids has several times been navigated by French officers.

and on the routes between the great lakes and the sea on the east coast, travels at the rate of from eighteen to twenty-three miles a day, each porter bearing a load of about 50 lbs., in some cases as much as 120 lbs. The **ox** will bear a load of about 150 lbs. on an average, but the use of this beast of burden is prevented throughout a large part of the region now described by the occurrence of the **tsetse fly**, whose bite is fatal to horses, oxen, sheep, and some other large mammals. The **Indian elephant** has been tried in African exploration with indifferent success; but it has been urged by persons well acquainted with the conditions of African transport that the **African elephant** could be used with greater success in opening that region. (See 88.)

832. For the development of commerce with inner Africa in the near future the most hopeful augury is to be found in the fact that **European nations are now seriously endeavouring to push their influence further and further into the interior.**

833. French influence prevails over the greater part of the north-west. The French colony of the **Senegal** now confines to a narrow strip the British settlements on the **Gambia**, at the mouth of which stands Fort Bathurst. A coast railway has been laid in French territory (from St. Louis, the capital, to Dakkar at Cape Verde), and a railway to connect the navigation of the Senegal with that of the upper Niger has been undertaken. The region supplies chiefly **ground-nuts**, **sesame**, **palm-kernels**, and other oil-seeds to the market of Marseilles. **Timbuktu**, situated at the distance of a few miles from the upper Niger, but far below the point of junction of the contemplated railway, is the chief centre of the caravan trade on the southern borders of the western Sahara. Among other commodities in which this trade is carried on is **salt**, which is obtained in the desert to the north of Timbuktu, and is almost wholly wanting in the Sudan. **Sierra Leone**, a British colony to the south-east, furnishes similar products, but palm-oil and palm-kernels begin to predominate, and these form the chief exports along the coast of Upper Guinea as far as the Congo. **Freetown**, the capital of Sierra Leone, has an excellent harbour, but a most unhealthy situation. **Sherbro**, in the eastern district, lies at the mouth of a river admitting vessels of 17 or 18 feet draught, and is growing in importance. **French Guinea** surrounds this colony on the north and the interior, and on the east follows the native republic of **Liberia.**[1] All the **Ivory Coast**, with the port of Grand Bassam, is now in French hands. The British colony of the **Gold Coast**, with the protectorate of Ashanti, comes next. Gold has of late years again become the leading export, but the export of cacao, the cultivation of which is interesting as a thriving native industry, has risen with equal rapidity. A railway runs from Sekondi in the

[1] Liberia is reported to be rich in payable gold and diamonds, as well as in iron, copper, and other minerals.

west to the gold-mining Tarkwa district, another from **Accra** in the east to the cacao district. Cape Coast Castle is still without a railway. The German **Togoland** next follows with the seaport of Lome, and then the French protectorate of **Dahomey** with that of Porto Novo.

833*a*. The whole of the coast-line of Upper Guinea from Liberia eastwards has a similar character to that on the east of the Indian peninsula, and it is no doubt to be ascribed to a similar cause. Though the prevailing winds all the year round are from the sea, these winds frequently give place in the early months of the year (January to April), when the southern seas are at their highest temperature and the inland parts of north Africa coolest, to a strong northerly exceedingly dry dust-laden wind, the **harmattan**, cool in the morning and evening but very oppressive during the day. The dust is blown in large quantities seawards, which quite accounts for the shallowness of the sea, the uniformity of the surf-beaten coast-line, and the absence of natural harbours, as well as the fact that the mouths of the rivers and the entrances to the coast lagoons are encumbered by bars. The flat coast-strips are everywhere very unhealthy.

834 To the east of Dahomey there lies an extensive territory now under British rule or influence, and forming one of the most promising regions of the continent. Since January 1, 1900, it has been made up of three administrative divisions under the British crown: (1) **Lagos**, in the south-west, with the protectorate of Yoruba to the north; (2) **Southern Nigeria**, to the east of Lagos, comprising the whole of the Niger delta with the territory to the north as far as about 7° 10′ N.; and (3) **Northern Nigeria**, all the British territory to the north on both banks of the Niger and Benue, including the states of Sokoto and Gandu and the part of Bornu to the west of Lake Chad. On the Benue it includes Yola. Northern Nigeria is the part containing the most civilised communities (825), and the most populous industrial and commercial towns. The **Hausa** are by all accounts the most vigorous race in west Africa, remarkable for their physical strength. Their language is estimated to be spoken by about 15,000,000 people, and is a *lingua franca* for a wide region. Of the towns, none of which is at a greater altitude than 2,500 feet, the most important is the mud-walled city of **KANO**, said to be situated in a district cultivated like a garden in every direction, and noted for hundreds of years as the place of manufacture of cottons and fine kinds of leather (including Morocco leather), which are sold in every part of north Africa. This fact in itself appears to warrant the expectation of a greatly extended commercial development with improved means of communication. A great variety of European goods already reach it from the Mediterranean. As many as 12,000 camel-loads are said to be brought thence annually to Kano, but that probably indicates at most about 2,000 tons. To the north-west of Kano is **Katsena**, the chief seat of

learning in Sokoto. The development of all this region in the past has been hindered mainly by the extreme unhealthiness of the coast, the inadequacy of the communications with the interior, and the ravages caused by the practice of slave-raiding. All these evils are now being rapidly remedied. The discovery of the part played by mosquitoes in the spread of malaria has aided in the adoption of measures for the suppression of that scourge. Wherever British occupation is made effective, the status of slavery is not recognised, and slave-raiding is put down. That fact in itself gives importance to the effective occupation of Borgu in the west and Bauchi and Bornu in the east, in both of which last two districts British residents were appointed in 1902, and to the capture of Kano and Sokoto in 1903. A railway has been made from the port of Lagos, across the lagoon lying behind it, to the healthier hinderland inhabited by the Yoruba, and has already reached the populous towns of **ABEOKUTA** and **IBADAN**. The construction of railways in Nigeria is strongly urged by the local administration.[1] The waterways of the Niger and Benue unfortunately do not serve as means of communication with the most populous and civilised parts of that region, these lying in the higher grounds towards the north at some distance east of the Niger.

834*a*. The **exports** both of Lagos and Nigeria are at present mainly derived from the forests immediately behind the ports, palm-oil, palm-kernels, and rubber being the chief. A few cacao plantations have been started, and from Lagos some sample cargoes of cotton[2] have been sent in the last few years. The cotton is said to be of good average quality, and its cultivation is being actively encouraged (**250**). In the coast strips, however, there is likely to be great difficulty in inducing the natives to engage in the steady industry necessary for any rapid extension of this culture, and probably much better results in this direction are to be looked for by the establishment of such means of communication as would make it practicable to bring down not merely raw cotton, but also oil-seeds, hides, and other bulky products from the more densely peopled and civilised hinderland in the north. Jute, another possible raw product of Lagos and Nigeria, could be grown only on the coast strip. The largest item among the **imports** is cotton tissues, and next in importance (besides articles necessary for trade requirements) stimulants of various kinds—tobacco, kola-nuts, but above all spirits (a regular curse among the coast tribes).

834*b*. Lagos, the chief port of the division of the same name, stands on a small island within a lagoon the entrance to which has a shifting

[1] A beginning has been made with the construction of a railway from Baro, on the left bank of the Niger in about 8° 40′ N., at the head of permanent navigation, to run through Bida, Zungeru (the seat of government), and Zaria to Kano. Probably a branch will in time be laid to the tin-mines already worked in the Bauchi and Zaria provinces, about 10° N. and 9° E. A careful estimate of the population of Northern Nigeria has made it under 7,200,000.

[2] The export of raw cotton from Lagos increased from 290,000 lbs. in 1903 to 2,440,000 lbs. in 1906.

bar with a depth varying from 9 to no more than 15 feet, so that large vessels have to load and discharge outside on a somewhat dangerous coast.[1] **Burutu** or **Bludu** on the Forcados arm of the Niger delta in the west of Southern Nigeria, a port accessible to vessels of large draught, is hence rising in importance as an *entrepôt*, from which the goods brought in ocean steamers are distributed by smaller coasters. **Akassa**, at the mouth of the main stream of the Niger, suffers from the same defect as Lagos, but **Old Calabar** or **Duke Town** in the east of Southern Nigeria has a deep and commodious harbour.

835. Adjoining Nigeria from the coast to Lake Chad is the German **Kamerun Protectorate**, yielding similar forest products, along with coffee and cacao grown on the slopes of the Kamerun mountain. **Victoria**, where vessels of 14-feet draught can lie alongside the jetties, is the chief port This protectorate is followed by the **French Congo Territory**, extending from the coast to the Congo and the lower part of the Mobangi. Corisco Bay, in the north of this region, is a Spanish possession. The whole of the coast south of the Congo as far as the river Kunene belongs to Portugal, and so too does a small portion to the north of the Congo. The land on the northern side of the estuary of the Congo, together with the greater part of the Congo basin east of the Mobangi, belongs to the **Congo Territory**, which existed from 1885 to February 1909 as the Congo Free State under the rule of the King of Belgium, but was annexed at the latter date to the Belgian Kingdom, with the result, it would appear, of bringing about a great improvement in the system of government.

836. By the international treaty under which the former state was founded no import duties could be levied by the state, but this provision was annulled in 1890, and there is now a common import tariff with the adjoining French and Portuguese territories. Steamers are maintained by the state above and below the falls, and a railway to avoid the lower falls, between Matadi and Leopoldville, was opened in March 1898. There has since been a great increase in the export of rubber, which is now by far the most important of the exports, which also include ivory and palm-kernels. In the district of **Katanga**, or Garenganze, an elevated region in the south-east of the state, valuable minerals (chiefly copper), are, however, known to exist. An Anglo-Belgian company has been founded for the exploiting of this region. The chief port is **Boma**. Above Leopoldville the chief town is New Antwerp (formerly Bangala), situated about the point where the course of the Congo changes from westerly to southerly.

837. The **Portuguese territories** south of the Congo comprise some of the finest land in tropical Africa. There are large districts in the north more than 5,000 feet in height, and consequently with a

[1] The construction of a deep harbour at Lagos is contemplated, but the cost would be very great.

climate almost European. The three seaports of **Loanda, Benguela,** and **Mossamedes** (the first and last with two of the finest natural harbours on the west coast) give name to three provinces, and a few miles to the north of Benguela, in 12° 20′ S., a fine natural harbour is formed by **Lobito Bay.**[1] The chief **exports** are **coffee, rubber, palm-oil** (the oil-palm flourishing as far as 10° S.), ivory, and, in the south, cotton. The **Kwanza,** the chief river in the north, is navigable for 200 miles (to Dondo).

838. In **East Africa** the **Portuguese** have for hundreds of years claimed authority over the coast **from Delagoa Bay to Cape Delgado.** The limit of their authority in the interior was, however, undefined till 1891, when a treaty was concluded with Great Britain fixing approximately the common boundary of the sphere of influence of these two powers. Under this treaty the Portuguese territory north of the Zambezi embraces both banks of the lower Shire, and a large area as far west as the Loangwa (about 30° E.). South of the Zambezi the boundary lies for the most part to the east of 33° E. The fine harbour of **Beira,** at the mouth of the **Pungwe** River, accommodating at spring-tides the largest ships, is now the port for Mashonaland (**821, 812*b***). A little to the south is the old port of **Sofala,** visited by Arabs even in the middle ages (**716*c***). **Chinde,** at the mouth of the most easily navigated branch of the delta of the Zambezi, having a depth on the bar varying from twelve to eighteen feet, has now quite superseded the old port of Quilimane (Kiliman). **Mozambique,** further north, has a small local trade.

838*a*. The Nyasaland Protectorate,[2] or British Central Africa, as it was formerly called, is a territory, under direct British administration, lying west and south of Lake Nyasa, and including the islands in that lake, and traversed in the south by the Shire River, along which it stretches on the left bank to the Ruo, and on the right bank to within a few miles of the Zambezi. This region was opened up by British missionaries and the African Lakes Company (also British) many years before it was proclaimed a British protectorate in 1891. On the Shire Highlands east of the middle Shire (**829*a***) stand **Blantyre,** the chief station of planters, and **Zomba,** the seat of administration. Coffee of excellent quality was at one time the chief plantation product, but since 1900 the production has declined, and cotton is now the most promising crop, and tobacco, from American seed, is grown with success, but at present only for South African consumption. With the exception of the Shire valley and strips along L. Nyasa and the brackish Lake Chilwa nearly all the territory is above 3,000 feet in height. The Mlanje Mountains south of L. Chilwa are above 8,000 feet in height, and near the north of the

[1] The construction of a railway on the South African gauge of 3 feet 6 inches from this bay to the copper-yielding district of Katanga in the Congo Territory has been begun. The railway will be about 900 miles long.

[2] Reckoned as part of Rhodesia, but under the administration of a Commissioner appointed by the Crown.

territory is a plateau called the **Nyika Plateau,** about 1,200 square miles in extent, with an average altitude of 7,000 feet, on which it might be possible for European colonists to thrive. On no parts yet settled is it possible for Europeans to do manual labour.

839. North of Portuguese territory nearly the whole of East Africa to about lat. 18° N. on the Red Sea is now partitioned into regions declared to be under British, German, and Italian influence respectively.

839*a*. German East Africa extends from the River Rovuma northwards to the British territory and westwards to Lakes Nyasa, Tanganyika, and Victoria Nyanza, and includes the island of Mafia. Good natural harbours for vessels up to about sixteen feet draught are afforded by the bays of **Dar-es-Salam′** and **Mikindani**; **Bagamoyo** has only an open roadstead, and **Tanga** and the other ports have bars allowing access only to Arab dhows or other small vessels. Dar-es-Salam′ is the starting-point of a caravan route through Tabora to Ujiji on Lake Tanganyika, but the only railway is from the northern port of Tanga to Korogwe in Usambara, where various tropical plantations have been established. The chief exports are coffee, rubber, and ivory.

839*b*. British East Africa embraces all the territory from the northern frontier of German East Africa to the river Jub, which separates it from the Italian Somaliland, stretching in the interior to the British-Egyptian Sudan on the north and the Congo Territory on the west. This territory is, however, under different administrations. The greater part of it forms the **British East Africa Protectorate,** which has a fertile but unhealthy coast strip producing gum copal, rubber, ivory, and other products, but in the interior is largely made up of deserts, although there are also considerable tracts of healthy highlands (**Kikuyu, Kenya, Laikipia, Mau, &c.**), forest-clad and adapted for the cultivation of tobacco and even European grains and roots (potatoes), but on the whole so little productive that the estimated population is under ten to the square mile. The parts round Lake Victoria Nyanza form the Protectorate of **Uganda,** which has much fertile land, fairly healthy except in the lower grounds. Even here, however, the estimated population is little more than twenty to the square mile. The two small but densely peopled islands of Zanzibar and Pemba (together about 1,000 square miles) form the Protectorate of Zanzibar. Of the ports of the East Africa Protectorate, Malindi or Melinde is historically interesting as that from which Vasco da Gama set sail for the coast of India in 1498, but **Mombasa** has a much better harbour—capacious and deep enough for vessels of thirty feet draught. A railway from this port to Port Florence on Ugowe Bay, the easternmost arm of Lake Victoria Nyanza, was finished in December, 1901; it is on the metre gauge,[1] and is 584 miles in length.

[1] A different gauge accordingly from that of the railways of Upper Egypt and the Egyptian Sudan and the 'Cape-to-Cairo' line (both 3 feet 6 inches).

Its commercial prospects appear to depend mainly on the probable resources of Uganda, but rubber and ivory seem to be the only products likely to be of importance in the near future. Uganda is indeed said to be admirably adapted for the cultivation of sugar-cane, coffee, tobacco, and other products, but it does not seem at all likely that such products, however cheaply produced, would be able to bear the cost of transport over so great a distance by a railway whose gradients are over a large part of its course steeper than 1 in 50, in places 1 in 30, and which reaches an altitude of 8,300 feet before descending again to the altitude of Lake Victoria Nyanza (3,775 feet).

839*c*. The islands of **Zanzibar and Pemba**, to the south of the British coast-line, are almost the last relics of an Arab sultanate which once held sway over the whole of the neighbouring coast, and to which a strip of ten miles on the coast still nominally belongs, though actually under either German or British administration. The town of Zanzibar, on the west side of the island of the same name, has long been the chief centre of trade in this region—a trade largely in the hands of merchants belonging to British India (Baniyas). On February 1, 1892, the port of Zanzibar was declared free, all customs duties except those on ammunition and strong spirits being abolished. Cloves are the chief commercial product of the islands.

839*d*. **Italian Somaliland** extends from the Jub to the mouth of the Gulf of Aden. On this coast lies the old Arab port of Mokdishu, Magadosho (in Portuguese spelling Magadoxo), or Madisha, now of little consequence. On the Gulf of Aden to the west is British Somaliland, with the ports of **Berbera** and **Zeila**, which carry on a trade with the fertile **oasis of Harrar**, which yields coffee for export, a trade, however, which is now threatened by the opening (1903) of a railway to Adis (or new) Harrar, situated at the base of the plateau below the oasis, from the French port of **Jibuti** at the mouth of the Gulf of **Tajurra**. A small tract all round this gulf belongs to the French, and French territory is succeeded to the north by the Italian colony or dependency of **Eritrea**, stretching to 18° 2′ N. and containing the ports of **Assab** and **Massaua** (Massowah).

840. **Abyssinia**, a country composed of lofty tablelands, in which the chief towns are situated at the height of about 6,000 feet above sea-level, is of little or no value as regards European commerce. Its present capital is Adis Abeba, situated at the southern edge of the tableland of Shoa in about 9° N. The Italians once claimed a protectorate over it, but renounced this claim in 1896.

841. Of the **African Islands**, by far the most valuable commercially at the present time are **Mauritius** (British) and **Réunion** (French). They are both covered with plantations of tropical products, of which **sugar** is the chief, the labourers being chiefly coolie immigrants (72). Mauritius annually exports more than 150,000 tons of sugar, chiefly to India the Australian colonies, the United Kingdom, and the

United States. Rum, vanilla, aloe fibre, and coco-nut oil are among its other exports. The **Seychelles**, a dependency of the Mauritius, export chiefly **coco-nuts and coco-nut oil. Socotra**, off the eastern extremity of Africa, an island annexed to the British Empire in 1886, is chiefly known in commerce for its **aloes**, although the species of *Aloë* which takes its name from the island is a native of South Africa (whence the drug is principally imported). The aloes derived from Socotra are probably obtained from *Aloë vulgaris* or some allied species. (See 'Kew Bulletin,' No. 44.)

842. The large island of **Madagascar** exports rubber, cattle, hides, wax, and a few other products, but has a very small commerce compared with its population of three millions or thereabouts. Its mountainous but well-grassed and well-watered interior is said to be admirably suited for cattle-rearing. Since 1885 the island has been a French protectorate, and since 1895 under direct French administration. Since the latter date preferential duties have been granted in favour of French goods, and in consequence the value of British exports to the island (previously between 100,000*l.* and 200,000*l.*) has dwindled to insignificance. The capital is **Antananarivo** on the plateau of Imérina in the interior, and its nearest port is Tamatave on the east coast. In the north-east of the island is the fine harbour of **Diego Suarez**, and on the west, nearly opposite Mozambique, Mojanga, at the mouth of the Betsiboka river. The **Comoro Is.** (French), north-west of Madagascar, furnish sugar, rice, and hides. The British islands of **Ascension** and **St. Helena**, in the South Atlantic, are now of little value commercially, though the latter was, before the opening of the Suez Canal, an important calling-station for the numerous vessels passing round the Cape of Good Hope. The **Cape Verde Islands** (Portuguese) are also of small commercial value, but St. Vincent has a magnificent harbour, which causes it to be used as a calling-station by Atlantic steamers.

843. Among the African islands in the Atlantic are the **Azores** (Portuguese), which supply immense quantities of oranges (St. Michael) and pine-apples; **Madeira** (Portuguese), which exports wine and fruit; the **Canaries** (Spanish), which have for some time supplied the London market with large quantities of early vegetables; **St. Thomas and Principe** (Portuguese), islands situated just north of the equator off the west coast, and having cacao, cinchona, coffee, and other plantations, cultivated to a large extent by negroes undergoing a forced 'apprenticeship.'

AMERICA

844. America, or the New World, is less than one half of the aggregate size of the three great continents of the Old World—Europe, Asia, and Africa. Its population, numbering about 125[1] millions, is estimated to be made up of the following elements:—people of European origin, about 58 per cent.; native Indians, about 15 per cent.; negroes, 18 per cent.; people of mixed race, 18 per cent.; Chinese, natives of India, &c., less than 1 per cent.

845. The **commerce** of America taken as a whole has one striking feature, namely, the **vastness of the scale** on which it is carried on relatively to the density of the population. This arises from the mode in which America has been peopled, especially since the great improvements in the means of communication brought about in the course of the nineteenth century. The prevailing characteristic of the development of American resources is the **rapid utilisation of cheap land** by devoting it on a large scale to the production of the commodities for which, under existing conditions of commerce, it is best suited.

845a. In consequence of this there is a large preponderance of bulky articles (food-stuffs and raw materials) among the exports of the continent, and this makes it in general impossible to balance the outward with the inward trade as regards quantity. Large numbers of empty railway waggons have to be hauled to the producing regions of the interior. This is an inducement to the railway companies to reduce the inward rates of carriage to the lowest point, for it is obvious that in these circumstances anything earned over the cost of collecting, handling, and delivering the goods is a profit to them. In some cases, however, the conditions are reversed. The trade across the Rocky Mountains carried on by the Canadian Pacific Railway is larger inwards than outwards. Inwards are carried large quantities of lumber, shingles, and other forest products of the Pacific seaboard, besides sugar, tea, and other bulky raw products of the Pacific islands and the Orient, while the heavy gradients of the Rockies tend to limit the outward trade in grain and cattle. This acts as an inducement to the company to stimulate that trade by low rates, especially for ocean

[1] This estimate referred to the year 1890. In 1900 the population was estimated at about 145,000,000, and there can be no doubt that the proportion of the European element has increased and is still increasing.

carriage. The development of the Yukon has done much to promote a westward trade in oats, and low rates of railway freight are tending to create a large trade in flour even with the Orient.

846. The situation of the American continent about midway between the most populous and productive parts of Europe on the one side, and Asia and Australia on the other side, is likewise noteworthy in relation to American commerce. The advantage of this position will become more apparent as population condenses on the west side of the continent. In the meantime, while the western market of America is comparatively small, such products as eastern Asia supplies are either obtained from other countries more favourably situated for the great eastern markets of America, or, in most cases, are imported by the longer, but unbroken, sea-route. Tea, for example, though imported into the United States almost exclusively from China and Japan, enters that country mainly by eastern ports. In 1886-87 less than one-tenth of the whole amount was introduced by way of San Francisco and other ports on the Pacific.[1] The only important eastern products the greater portion of which is introduced into the United States by western ports are raw silk and rice. Raw silk is the most valuable of all these commodities in proportion to its bulk, and therefore best fitted to bear the cost of land-carriage. Rice, on the other hand, is largely consumed in California by the Chinese, who are mainly settled in that part of the country, and the eastern demand for rice is probably in a large measure supplied by the rice produced in the country (894).

[1] The latest consular reports show no change in this respect.

NORTH AMERICA

847. Including the West Indian Islands, this division of the New World comprises more than half the area and more than two-thirds of the population belonging to the whole.

The **surface** is made up mainly of plains and tablelands, and the great mountain chains have a more or less southerly trend. In the west a series of lofty mountains stretch through the entire length of the continent, rising from a tableland, 4,000 feet or more in height, which at its widest (about lat. 40°) extends over fully one-third of the breadth of the United States, and east of the mountains slopes very gently downwards to a great plain. The mountain chain which rises above this tableland in the east is the **Rocky Mountains**, in the stricter application of that name. But this name is also applied more generally to include a great number of shorter mountain ranges, which vary the surface of the tableland, and nearly all of which trend north and south, or in a direction which does not greatly deviate from that. The **Cascade Mountains** and the **Sierra Nevada** are the principal mountain chains that border the tableland in the west, in the wider part of the continent; and still further west are lower mountains, known as the Coast Range. Towards the south, in the narrower part of the continent, the tableland stretches almost from sea to sea. Several **railways** now cross these mountains. Those in the middle part of the system, where the traffic is most active, do so at passes varying from about 5,800 to upwards of 8,000 feet in height (864). The only other great mountain system of North America is that of the **Appalachians** or **Alleghany Mountains**, which extend in long parallel chains in the same general direction as the Atlantic coast.

848. A chain of magnificent **lakes**, Lakes Superior, Michigan, Huron, Erie, and Ontario, is drained by the St. Lawrence into the Atlantic, and together with that river form an invaluable means of internal communication, and the great rivers of the plain are likewise of the highest service in this respect.

849. The general correspondence between the **climate** of the west of North America and that of western Europe, and between the climate of the eastern side of the continent and that of eastern Asia, has been referred to in the paragraphs relating to climate generally (36, 36*a*). Here two features in that correspondence may be recalled

to mind—first, the more equable climate of the temperate zone in the west than in the east, and secondly, the dearth of rain in the west, south of the parallel of 37° or 38° N. (**39***b*); and it is only necessary to add some particulars regarding the effect on the climate of the continent of some of the great physical features. (See the diagrams at p. 460.)

850. **Important climatic effects are due to the direction of the mountain chains.** The western mountains, shutting off the moisture from the Pacific, cause a large part of the interior of the United States to be too dry for agriculture without irrigation. It is mainly from this cause that the greater part of the area of the United States west of 100° W., with the exception of a portion of the maritime strip, has this arid character (**38, 39**). Further, the open plains and gently rising ground between these mountains and the Appalachians allow even the most southerly points of the United States, as well as the east coast of Mexico, to be swept from time to time by keen winds from the north, so that ice forms at the mouth of the Mississippi in lat. 30° N.; and even in the extreme south of Texas (lat. 26° N., about the same latitude as Patna in Bengal) as much as 14° of frost has been experienced. In the winter of 1885–86 a severe frost seriously injured a large proportion of the trees in the orange-groves of Florida, and the recurrence of frosts has now extinguished orange-growing in all the Gulf states. Even below St. Louis (38½° N.) the Mississippi navigation (**884**) was partly closed by ice for 33½ days on the average of the twenty-three years 1865–66 to 1887–88. (Comp. **35, 326***a*.)

851. Other important effects on the climate are due to **the great gulfs** in the north and south, **Hudson's Bay**, and the **Gulf of Mexico**, as well as to the great lakes, the aggregate area of which is larger than that of Great Britain. Besides exercising an equalising effect on the temperature, as great bodies of water always do, they are all sources of moisture, especially during the summer months, when moisture is most needed. It is in a large measure from this cause that north and east of the arid region of the continent the plains are supplied with rain enough at least for the growth of pasture grasses and other herbage. These plains form the **prairies** of North America. They are for the most part treeless, except near the river banks, but experiments have shown that it is possible to extend the area of forests in this region, and in some places steady efforts are being made to do so.

852. Notwithstanding the great extent of the arid lands in the western half of the broader region of the continent, there is, according to Voeikof, the celebrated Russian meteorologist, no other part of the earth with a considerable rainfall during the summer months over so great an extent of territory in middle latitudes; and this circumstance explains in a great measure the success with which such crops as maize, sorghum, and cotton are here cultivated over such wide areas.

852*a*. For a long period after the discovery of America, the only important commodities furnished by North America were the precious

metals derived from the West Indies and Mexico and cod from the Great Banks of Newfoundland (363). The West Indies and Mexico were entirely in Spanish hands. The feeble Indians of the islands were easily subjected at the time of their discovery in 1492 and the years immediately following, and the Aztec empire in Mexico was overthrown by Cortez in 1519–21. The mines of the precious metals in the West Indies were soon exhausted, but those of Mexico have never ceased to be extremely productive (663*a*). Though the first English voyage to America, that which set sail from Bristol under the Venetian, John Cabot, in search of a north-west passage to India, was made in 1497, and though it was in virtue of that voyage that the English afterwards laid claim to a great part of the coast of North America, the first settlements in the temperate latitudes of that continent were made by the French. The banks of the St. Lawrence were explored by Jacques Cartier in 1533–43; but the first successful French settlements were due to the efforts of Samuel Champlain (1602–35). He founded Quebec in 1608, and a few years after his death Montreal was founded in 1642. French explorations and a few isolated French settlements were made higher up, but the rapids above Montreal put a limit to continuous settlement by the French. All the territory on both banks of the St. Lawrence below Montreal continued to be French till the capture of Quebec by General Wolfe in 1759. Meantime settlements were made by other countries elsewhere. The first attempted settlement of the English was a failure. It was made on Roanoke Island in Pamlico Sound at the suggestion of Sir Walter Raleigh in 1585, but the survivors of the settlement were brought back to England by Sir Francis Drake in 1586. The first successful English settlement, known as Jamestown, was made in 1607 on a promontory of the James River, at the mouth of Chesapeake Bay. This former promontory is now an island in the river, on which the relics of this settlement are carefully preserved by the government of the United States. The next English settlements were made in Massachusetts—at Plymouth in 1620, and on Massachusetts Bay in 1628–30. In 1612 the Dutch began to trade at the mouth of the Hudson, a river discovered by the English navigator of that name when in Dutch service, and in 1623 the first regular colony was founded by the Dutch West India Company on Manhattan Island. This formed the nucleus of New Amsterdam, whose name was changed to New York when it was taken by the English in 1664. Forest produce, hemp, and in the southern settlements tobacco, formed the principal articles of export trade among these communities. Early in the seventeenth century, however, furs began to reach Europe from Hudson's Bay, and in 1670 this trade became a monopoly of the English Hudson's Bay Company (353). Sugar, coffee, and cotton gradually came to be important products of the West Indies, but it was not till after the severance of the English colonies from the mother country in the war of independence (1776–83) that cotton came to

be extensively cultivated on the mainland (250, 252). But the great commercial development of North America is that which has followed the introduction of steamships and railways. By that means bulky produce of the far interior, such as grain and provisions, could for the first time be conveyed to Europe at a sufficiently low cost to allow of the growth of an immense trade in these commodities.

COUNTRIES OF NORTH AMERICA

GREENLAND

853. Greenland is a large mass of land, or group of islands (it is uncertain which), almost wholly buried under ice. The few settlements on the west coast, inhabited chiefly by Eskimo under Danish rule, are of no importance in commerce, except as being sometimes visited by whalers (**358*c***) and as a source of cryolite (**423·9**).

BRITISH AMERICA

854. A. The Dominion of Canada is situated to the north of the United States, from which it is separated partly by the middle line of Lakes Superior, Huron, Erie, and Ontario, partly (west of the Lake of the Woods) by the parallel of 49° N. The inhabitants are mainly of British origin and Protestant in religion; but **French Roman Catholics** make up about one-third of the population, chiefly in Quebec, where the first colonists were French (**852*a***). There are about 120,000 **Indians**, most of whom are hunters, roaming over the forest regions of the North-west, and living by the sale of furs to the fur-trading companies. The islands of the Arctic Archipelago are of interest in the history of commerce, from the fact that a **North-west Passage** to eastern Asia was for centuries sought in vain among the channels that separate them. A passage was at last effected by Maclure in 1850–53, but the route is too much encumbered by ice to be of any use commercially.

855. The Dominion, formed in 1867, by the union of separate colonies, has a general government and parliament for the common affairs, but it has nine provinces (some of which correspond with old colonies) with separate parliaments, empowered to deal with matters of local concern. These **provinces** are Nova Scotia, Prince Edward Island, New Brunswick, Quebec, Ontario, Manitoba, Saskatchewan, Alberta, and British Columbia. In addition to these there is a vast territory on both sides of Hudson's Bay, not yet so organised. The seat of the general government is **Ottawa**, in the province of Ontario (**874**). With the view of **encouraging immigration**, the government of the Dominion gives a free grant of 160 acres of land (subject to a small fee for registration) to settlers who undertake to reside on the land and prepare it for cultivation.

856. The **extent** of the Dominion territory is upwards of three millions of square miles, but the **more populous portion** of this vast area is confined to the region south of the St. Lawrence west of the city of Quebec, and the land on the north adjacent to that river and to the great lakes from Quebec to the eastern shores of Lake Huron. The whole of the more populous area lies at least two degrees further south than the southernmost point of England, but from two to six degrees further north than southern Manchuria, which may be considered the corresponding region of Asia (779).

857. The **surface** east of the Rocky Mountains is made up principally of plains and undulating lowlands. **Tundras,** similar to those of northern Russia and Siberia (629, 699), cover large tracts in the north, descending in the east to about 58° N. on the western shore of Hudson's Bay, and still further east extending along the whole coast of Labrador. There next follows a range of vast **forests,** chiefly of pines and firs, a region that embraces the whole of the Dominion east of Lake Winnipeg, except the tundra area and the limited portions cleared for agriculture. In the west of the Dominion, this region is succeeded to the south by the **prairies,** which extend furthest north on the gently sloping tablelands immediately to the east of the Rocky Mountains. The nearly treeless prairies here extend about 3½ degrees north of the United States frontier, and the area with less than 20 per cent. of forest land reaches about 10 degrees north of that frontier, between the Rocky Mountains and Lake Athabasca. For the future development of the Canadian Dominion this prairie region is of the highest importance, for it contains **vast areas ready for the plough,** with soil of the richest description, and a climate admirably adapted for agriculture, though very different from that of England. In this prairie region there is a rise on the whole from east to west, and this rise takes place in such a manner as to form what are known as the three prairie steps. The lowest level in this region is that of the Red River Valley, between 700 and 800 feet. West of that valley the surface rises to about 1,500 feet, and this terrace stretches westwards for about 250 miles. The ground then rises to about 2,000 feet, and then the rise is more gradual to the foot-hills of the Rocky Mountains.

857*a*. In the **eastern half of the Dominion,** the **geological structure** is of peculiar geographical importance. It is of such a nature as must for ever forbid extensive settlement. From the banks of the St. Lawrence, some little distance below Quebec to the Red River valley, there extends an enormous region of ancient crystalline rocks, protruding in many places in naked masses, in other places having only a thin covering of soil supporting forests of fir and pine. The principal exception to this character is the area already referred to as the most populous in the Dominion, but there are also many larger or smaller isolated valleys with a deep and fertile soil, which will no doubt some day be the seats of prosperous though scattered communities.

858. The general similarity between the climate of North America and that of corresponding latitudes in Europe and Asia is noticed in par. **849**, but some details are of importance (see diagrams, pp. 460–61). East of the Rocky Mountains the climate of the Dominion generally is characterised by those extremes of temperature which prevail in the same latitudes in the northern hemisphere everywhere, except in regions exposed to south-westerly winds from the ocean. But an important difference between western Canada and Europe is due to the fact that the whole area between the Rocky Mountains and the Pacific coast is mountainous, and that the mountains run throughout parallel to the coast and nearly at right angles to the prevailing winds. Hence great contrasts, both in respect of rainfall and temperature, begin within a short distance of the Pacific. At New Westminster, at the mouth of the Fraser, the mean temperature of the coldest month of the year is 36° F., of the hottest about 58° F., and the total precipitation[1] 65 inches; at Lillooet, higher up the Fraser valley but behind the Coast Range, the corresponding figures for temperature are 22° F. and 68° F., for rain- and snow-fall about 13 inches. To the east of the Rocky Mountains the total precipitation is very scanty, though it begins to increase again in eastern Assiniboia.[2] But as the future development of the Canadian North-west must depend to a large extent on the cultivation of European grains, and more particularly of wheat, two counter-considerations affecting this industry must be borne in mind. First, it is important that the great bulk of the total precipitation takes place during the summer months. (See par. **39***c* and the diagrams on p. 21.) Second, throughout the Dominion of Canada a considerable proportion of the precipitation takes place in the form of **snow**, the amount of which, however, is much greater in the east than in the west. At Montreal the average of the fifteen years previous to 1885 was nearly 120 inches; at Toronto, the average of forty-four years, 70 inches; and even in 42° S., in the extreme south of Ontario, the same latitude as the northern frontier of Portugal, in a district in which grapes are grown for wine-making in summer, the average of fourteen years was 57 inches. At Winnipeg, in Manitoba, the average of the same period was only 50 inches. Two advantages for wheat-growing accrue from this snowfall, one experienced principally in the eastern half of the Dominion, the other in the west. In the east the total precipitation is ample, and is fairly equally distributed throughout the year, and there

[1] Including both rain and snow. The meteorological office of Canada reckons ten inches of snow as equal to one inch of rain (of course only a very rough average).

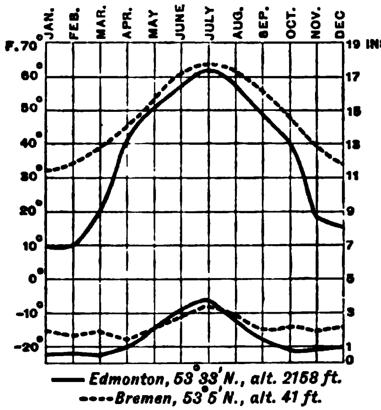
[2] At five out of six stations in Alberta, western Saskatchewan, and western Assiniboia, for which nine years or longer averages could be calculated down to 1901, the average varied from 15 to 18 inches, but at the sixth, Chaplin, in the middle of Assiniboia, it was as low as 5 inches. At Qu'appelle in eastern Assiniboia the average was 20, and at Winnipeg (alt. 760 feet) the average of twenty-two years was 21 inches.

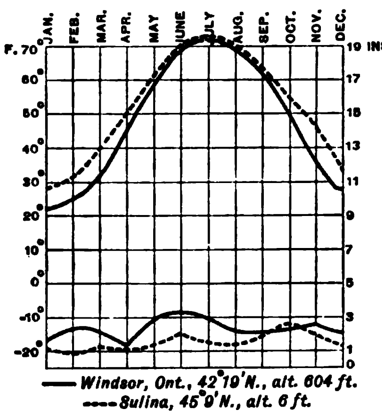
the great advantage of the snow as regards wheat-culture is that it protects the ground against the severe frosts. There accordingly winter wheat (or, as it is called in America, fall wheat) can be regularly grown, whereas in Manitoba and the north-west the frost comes before the snow, and hence only spring wheat can be cultivated. But in this part of Canada it is important that the melting in spring of water frozen underground furnishes moisture just when it is wanted. In the more arid parts of the north-west, however, irrigation is necessary, and is receiving attention both on the part of the government and private companies.[1] But in those parts in which wheat is most largely grown, it is not the total amount of the annual rainfall that determines the amount of the produce.[2] The chief disadvantage of the Canadian climate for wheat-growing, and especially in the north-west, is the liability to the occurrence of frost before harvest, but this risk is being greatly reduced by the careful selection of seed and the cultivation of hardy varieties of wheat, which ripen quickly, and, as it happens, yield hard wheats of exceptionally high value. The correspondence between the temperatures of Canada and those of Asia is indicated in par. 699, but it must be remembered that the summers that follow the cold but dry, invigorating, healthy, and pleasant winters are remarkably bright as well as warm. 'The whole of Canada, with the exception of near the coast in British Columbia, is favoured with more sunshine than any portion of Great Britain, Germany, Holland, or northern France.'[3] In winter the temperature in districts adjacent to the great mountain ranges is greatly mitigated by warm, dry, or moist winds, from the south-east, south or south-west, west of the Rocky Mountains, and from the south-west, west or north-west to the east of the Rocky Mountains, those in the latter case being such as are experienced in all parts of the world on the lee-side of mountains exposed on the weather-side to copious rains. In Canada they are known as chinook winds. In southern Alberta they cause the cold of winter to alternate with spells

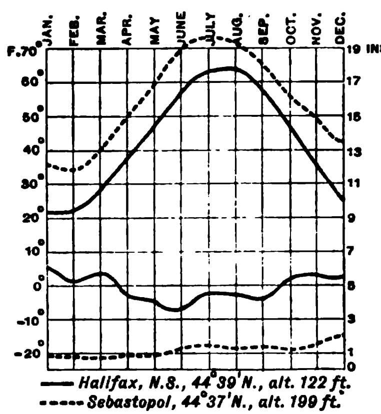
[1] In the extreme south-west of Alberta the Canadian North-west Irrigation Company has constructed over 100 miles of irrigation canals, embracing an area of above 500,000 acres. A scheme to irrigate about 1,500,000 acres spread over an area of about double that extent east of Calgary is now being carried out by the Canadian Pacific Railway Company. Ditches are to irrigate each of the 160-acre sections into which the block is divided, though not in every case wholly. The irrigated lands are suited to lucerne (alfalfa), field peas, and other fodder crops, sugar-beet, barley, &c., while winter wheat can be grown on the land above the canal system. Another large irrigation scheme is being carried out on the Bow R. about 113° W.

[2] Between 1883 and 1901, the average precipitation in Manitoba varied from 12 to 22½ inches and the average yield of wheat per acre between 9 and 28 bushels, but there was no marked correspondence between the rainfall and the yield. Data are not yet available for a long enough period to establish any relation between the wheat-yield and the seasonal distribution of the rainfall, but the experience of farmers and such data as exist point to the peculiar importance of the rains of May and June for the north-west. (See the rainfall diagram for Winnipeg opposite.)

[3] R. F. Stupart, in an article on the Canadian climate in *Symons's Meteorological Mag.*, vol. xxxviii. p. 32.







OGICAL DATA, CANADA, EUROPE AND
perature curves above, rainfall below.

on left, inches of rainfall on right.
uropean or Asiatic dotted or broken lines.

of bright warm weather, in which the ground is swept bare of snow and the pasture grasses are revived, and they thus make the rearing of live-stock the characteristic industry of this part of the north-west.

859. With regard to the **internal communications** of the Dominion, it is noteworthy, in the first place, that the **St. Lawrence** River and the great lakes, supplemented by a number of short canals (the longest is about 27 miles), form a system of internal navigation for sea-going vessels unparalleled in any other continent. The first of these canals to be constructed was the **Lachine Canal** immediately above Montreal, opened in 1825, and other canals between Montreal and Lake Ontario were completed by 1848. The **Welland Canal**, which runs parallel to the Niagara River and avoids the Falls of Niagara between Lakes Erie and Ontario, and is the longest, was constructed in 1824–29. It has 26 locks with a total rise of 326¾ feet. The shortest, but perhaps the most important, is the **Sault Ste. Marie** ('Soo') **Canal** between Lakes Superior and Huron, which was constructed between 1889 and 1895.[1] It is little more than a mile in length, and has only one lock, measuring 900 by 60 feet, with a depth on the sill of 20·8 feet at the lowest known water-level. Since 1899 all the other canals on the route have had a minimum depth of 14 feet.[2]

860. By this series of waterways, sea-going ships[3] may be carried up a distance of 2,260 miles from the straits of Belle Isle, in the north of Newfoundland, **to Port Arthur** on Lake Superior, and within about 1,915 miles by rail of Vancouver, the seaport at the Pacific terminus of that railway. On the United States side they are carried up a distance of **2,400 miles to Duluth,** at the very head of Lake Superior, which is now within 1,890 miles by rail of the nearest Pacific port. An important project is now being considered for shortening this route by the construction of what is called the Ottawa and Georgian Bay Canal. The proposal is to make a water-way running on the whole nearly due west from Montreal (see map, p. 465) by deepening the Ottawa, connecting it with Lake Nipissing and this lake with Lake Huron (Georgian Bay). The estimated reduction of distance to places on Lake Superior and Lake Michigan would amount to 340 miles. As recommended by a committee of the Dominion Parliament this waterway would have a total length from Montreal

[1] Since 1855 there has been a canal on the United States side at the same place, and on this side there are now (since 1896) two locks, the larger of which is 800 by 100 feet with a depth on the sill of 22 feet. The traffic through these canals is now the greatest canal traffic in the world—much greater than that through the Suez Canal. In 1855 the registered tonnage that passed through the United States Canal was little more than 100,000 tons; in 1875 above 1,000,000 tons; in 1890, above 9,000,000 tons. In 1901 the traffic through all the three locks was 24,627,000 register tons. The actual freight carried in 1902 was 35,961,000 tons, of which 4,728,000 tons passed through the Canadian lock.

[2] It has been resolved (1908) to deepen the Welland Canal to 25 feet.

[3] This, however, is not generally found to be economical. It is more advantageous to have special ships built for the lake and canal traffic.

to Georgian Bay (Lake Huron) of 425 miles, of which 44 miles would be entirely artificial, 74 miles improved river navigation, and the remainder, 307 miles, would consist of river and lake needing no improvement to admit of its being navigated by vessels of 20-feet draught. The proposed canal depth is 22 feet. The northerly situation of this canal would, however, give it a very short season, after harvest, free from ice.

861. The St. Lawrence navigation is usually open from about the end of April to near the end of November, or even the first week in December. The route from the mouth of the St. Lawrence, round the north of Newfoundland (by the straits of Belle Isle), is closed for a longer period than that by Cabot Strait, round the south of Newfoundland, which adds about 160 miles to the distance to Liverpool. Another drawback arises from the force of the current of the St. Lawrence and the liability to fogs, especially at the mouth of that river—circumstances which combine to render the navigation somewhat dangerous.[1]

862. Besides this leading highway for ships, the Canadian Dominion possesses other less important inland waterways. The river **Ottawa** is continuously navigable, with the aid of a few canals, as far as the city of Ottawa; and from thence there is a navigable connection by the Rideau River and Canal with **Kingston** on Lake Ontario. The Trent Valley Canal now in progress will provide a waterway, for the most part natural, 7½ feet deep, between the Bay of Quinte, Lake Ontario, and the south end of Georgian Bay.

863. **Above Lake Superior, navigation** can be continued with little interruption by **Rainy Lake** and **River, Winnipeg Lake** and **River,** and the **North Saskatchewan River** to near the base of the Rocky Mountains. The **Assiniboine** and **Red River,** which both belong, like the Saskatchewan, to the basin of Lake Winnipeg, are likewise navigable, but the **Nelson,** the outlet of Lake Winnipeg to Hudson's Bay, is too much obstructed by rapids to be of great service as a waterway.

864. In the more populous parts of the Dominion there is a tolerably complete network of **railways,** and since November 1885, when the **Canadian Pacific Railway** was completed, there has been uninterrupted railway communication from ocean to ocean within Dominion territory. The tables on pp. 463 and 464 exhibit some of the more important elements in the comparison of this railway, as a transcontinental means of communication, with the chief transcontinental routes of the United States. It will be observed from Table I. that the Canadian Pacific has an advantage over both its older rivals, the Northern Pacific and the Union and Central, in the lower height of its passes, and the shorter length of route at high levels. The Great Northern Railway, the main line of which was completed in 1893, has, however, as favourable a route on the whole as that of the Canadian Pacific. The western portions of the more northerly of these great transcontinental routes are shown on the map opposite p. 472.

[1] The Canadian government is now taking steps to reduce the risks due to these causes.

TABLE I.

Railways across Rocky Mountains.

Railway	Length in miles		Height in feet of highest levels in order from west (left) to east (right)		
	Above 3,000 feet	Above 4,000 feet			
Canadian Pacific . . .	200	115	2,000	4,500[1]	5,300[2] / 4,410[3]
Grand Trunk Pacific[4] . .	—	—	—	—	3,700
Great Northern . . .	240	45	3,375[5]	—	5,202[6]
Northern Pacific . . .	410	110	3,950	5,560	5,560[7]
Union and Central . .	1,420	1,280	7,017[8]	7,400	8,240[9]
Denver and Rio Grande[10] .	All	All	—	10,418	10,856
Atchison Topeka and Santa Fe	1,120	820	3,820[11]	7,260	7,600
Southern Pacific[12] . .	610	510	−263[13]	4,512	5,082

864a. On the eastern side of the Rocky Mountains the ascent of the main line of the Canadian Pacific Railway to the summit is comparatively easy. A gradient exceeding 1 in 100 occurs over only about half a mile. But soon after passing the summit on the west side a very rapid descent takes place. There is a drop of 1,150 feet in seven and a-half miles, involving gradients rising at one place to 1 in 22, so that the speed in descending has to be reduced to an average of less than ten miles an hour—at one place only five miles an hour. Compare **845***a*.

865. All the railways of Canada, like most of those of North America generally, are on the same gauge as our own—4 feet 8½ inches. The great majority of the railways are in the hands of private companies.[14] By amalgamations most of the private railways have been brought under the control of two great companies, the Grand Trunk Railway, the older of the two, and the Canadian Pacific. The most important line of the Grand Trunk system is that connecting Montreal on the one side with the south-west of the peninsula between Lakes Huron and Erie, there communicating with the shortest line in the United States to Chicago, the great lake-port at the head of Lake Michigan, and on the other side, after crossing the St. Lawrence by a

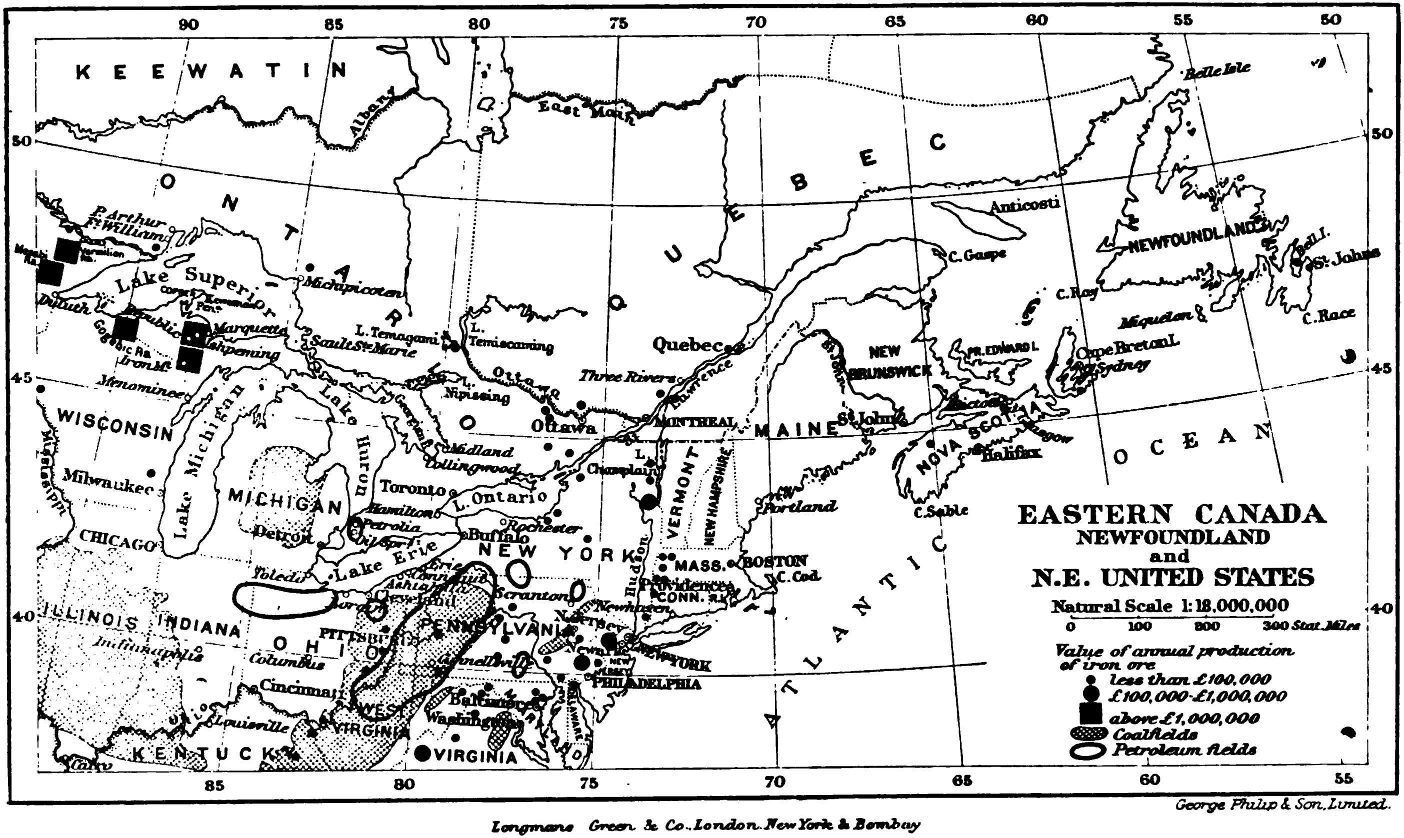
[1] Roger's Pass, Selkirk Range. [2] Kicking Horse Pass.
[3] Crow's Nest Pass. [4] See p. 466 *n*. [5] Cascade Tunnel.
[6] Summit Station, Montana. [7] Bozeman Tunnel, Belt Range.
[8] Truckee Pass, Sierra Nevada. [9] Evans Pass, Rocky Mountains.
[10] Connecting Denver, Colorado, with the Union and Central at Ogden, near Great Salt Lake, Utah. The altitudes given are on different routes between Pueblo and Grand Junction.
[11] Cajon Pass, California, on Los Angeles branch.
[12] San Francisco to New Orleans. [13] Lowest level, in southern California.
[14] In 1906 there were 1,713 miles of government, against 20,454 miles of private railways, inclusive of electric street railways. The electric railways have increased very rapidly since 1894.

TABLE II.

Railway	From	Length in statute miles		Length in nautical miles from respective Pacific or Atlantic ports to			Total ocean route Liverpool to H.-Kong
				Yokohama	Hong-Kong	Liverpool	
C. P. R.	Vancouver[1]	To Port Arthur 1,915	To Montreal . 2,908	4,330	5,890	2,800	8,690
	" By Intercolonial Railway . .	" . . .	" Halifax . 3,742	"	"	2,480	8,370
	" " Short Line[2] . . .	"	" " . 3,595	"	"	"	"
	" " Intercolonial Railway . .	"	" Louisburg 3,910	"	"	2,240	8,130
	" " Short Line	. . .	" " . 3,780	"	"	"	"
	" " Shortest connections . .	" . . .	" New York 3,162	"	"	3,030	8,920
N. P. R.	Puget Sound, New Tacoma " . .	" Duluth 1,915	" " . 3,251	"	"	"	"
	Portland, Oregon " " . .	" 1,890	" " . 3,235	4,250	5,810	"	8,840
U. & S.	San Francisco " " . .	" Chicago 2,356	" " . 3,270	4,510	6,070	"	9,100

[1] Under an agreement between the Imperial Government and the Government of the Canadian Dominion, a permanent line of first-class steamships, suitable for service as armed cruisers, now plies between Vancouver and Hong-Kong by Yokohama. The first mails by this new route were delivered in London on May 18, 1891—25 days after leaving Yokohama, 32 days after leaving Shanghai, notwithstanding a delay of three days at New York.

[2] The Intercolonial Railway keeps close to the south bank of the St. Lawrence from Point Levis opposite Quebec to about longitude 68° W., and runs entirely through British territory; the 'Short Line' (opened on June 3, 1889) is the shortest practicable route from Montreal to the Ports of New Brunswick and Nova Scotia, and runs partly through United States territory.


EASTERN CANADA
NEWFOUNDLAND
and
N.E. UNITED STATES
Natural Scale 1:18,000,000
0 100 200 300 Stat. Miles
Value of annual production of iron ore
less than £100,000
£100,000-£1,000,000
above £1,000,000
Coalfields
Petroleum fields
KEEWATIN
ONTARIO
QUEBEC
NEWFOUNDLAND
ATLANTIC OCEAN
NEW BRUNSWICK
NOVA SCOTIA
MAINE
VERMONT
NEW HAMPSHIRE
MASS.
CONN.
NEW YORK
PENNSYLVANIA
OHIO
MICHIGAN
WISCONSIN
ILLINOIS
INDIANA
KENTUCKY
VIRGINIA
WEST VIRGINIA
Lake Superior
Lake Michigan
Lake Huron
Lake Erie
L. Ontario
Anticosti
Quebec
Montreal
Ottawa
Toronto
Boston
Philadelphia
Pittsburg
Chicago
Halifax
St. John's
George Philip & Son, Limited.
Longmans Green & Co. London. New York & Bombay

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bridge nearly two miles in length (including approaches), proceeds to the United States seaport of Portland (Maine).[1] The other is the line which connects the Canadian Pacific Railway at Sudbury with Minneapolis in the United States by way of Sault Ste. Marie, and thus affords the shortest route from one of the most important wheat and timber regions of the United States, not only to the eastern seaports of Montreal and Quebec, but also to the north-east of the United States, including the port of New York. Within the United States the connection is established by the Minneapolis, St. Paul, and Sault Ste. Marie railroad, which about the end of the nineteenth century was brought into connection with the Canadian Pacific Railway by another line running north-west through the coal-mining town of Estevan to Pasqua west of Regina in eastern Assiniboia. A railway from Sault Ste. Marie to Duluth was completed in 1888.[2]

866. The construction of a **railway** from the rapidly developing grain-growing province of Manitoba (875) **to a port on Hudson's Bay** has frequently been discussed. The importance of this railway arises from the fact that it would form the shortest route for the products of the North-west to England, but its value depends in a great measure on the **navigability of Hudson's Bay** and Hudson's Strait. The difficulties of navigation are almost confined to the strait, which is 500 miles in length, and for the greater part of the year is obstructed by ice. There is every reason to believe, however, that for at least two or three months every year, and probably for steamers of suitable build considerably longer, this route would be available. The ocean length of this route from Liverpool would be 2,930 nautical miles to **Fort Churchill**, or 2,970 nautical miles to **Port Nelson** at the mouth of the

[1] A separate company, known as the Grand Trunk Pacific Railway Company, which, however, receives financial support from the Grand Trunk Railway, is now, in co-operation with the Government of the Dominion, engaged in constructing a new transcontinental railway within Dominion territory. The starting-point of construction in the east is Moncton, New Brunswick, 89 miles from St. John and 183 miles from Halifax by the Intercolonial Railway. Thence the line is to run westwards to the south of the Intercolonial Railway, and to cross the St. Lawrence by a bridge 150 feet above the level of high water, at a point five miles above Quebec, and then to run west by the north of L. Nepigon to Winnipeg. This eastern section of the line, about 1,800 miles in length, is to be constructed by the Dominion government and leased to the company for fifty years at a rental based on the cost of construction, but the branch lines, to Montreal, to North Bay on L. Nipissing (connecting with the Grand Trunk Railway system in eastern Ontario) and Fort William on L. Superior, are to be built by the company. The section from Winnipeg to Edmonton, about 775 miles in length, was begun in 1905. (See the map opp. p. 472.) The maximum gradients on this section are to be four-tenths of 1 per cent. or about 22 feet in the mile. The mountain or Pacific section is to be carried over the Yellowhead Pass (about 3,700 feet) in the Rocky Mountains, and is to terminate at Kai-En island (877). Care is to be taken that the maximum gradients on this section do not exceed 1 per cent. or 53 feet in a mile. The easy gradients contemplated would facilitate the carriage of grain to the Pacific, and this, together with the short voyage to the Orient (877), would probably enable the Canadian North-west to compete in the supply of grain to the future industrial region of northern China (774–774*b*).

[2] A double railway tunnel is being built between Windsor and Detroit.

Nelson River. The additional distance by railway from the junction with the Canadian Pacific at Winnipeg is about 650 statute miles.

867. The minerals of most importance commercially at present, or likely to be so in the immediate future, are coal (in the three forms of lignite, bituminous coal, and anthracite), gold, silver, nickel, copper, and iron. The coalfields are enormous in extent, though as yet worked only where there are special facilities for commerce, as in the neighbourhood of seaports (in the north of **Nova Scotia**, and in **Vancouver Island**, British Columbia), and at various points on or near the **route of the Pacific Railway**, where it is very abundant. Extensive as the coalfields are, however, it is important to note that there is no coal between the unimportant deposits of New Brunswick and those of Manitoba, that is, in all the most populous area of the Dominion. It is this that makes Canada so largely dependent on the United States, not only for anthracite, which is the fuel ordinarily used for domestic purposes and which enters the Dominion duty-free, but also for bituminous coal, which is subject to duty. In British Columbia a coalfield producing coal of excellent quality has been opened immediately to the west of the Crow's Nest Pass, since the branch of the Canadian Pacific Railway through that pass was opened. The amount of coal in this neighbourhood is said to be of enormous extent, one of the most extensive deposits known to exist in the world. The Vancouver Island coal is important as the only good coal as yet worked on the Pacific Coast. **Iron ore** is met with in many places.[1] **Gold** is obtained in largest quantity in the Yukon district of the North-west Territories, and also in British Columbia and Nova Scotia. British Columbia produces, too, the bulk of the silver and copper of Canada, but copper is also produced along with nickel at **Sudbury** in Ontario. This province, moreover, produces nearly all the petroleum of Canada (in Lambton county) and most of the Canadian salt (near Lake Huron).

868. The tables on pp. 590 and 612 show the principal features of the external commerce of Canada, and the changes that have taken place therein since 1872. Among the **exports** it will be noticed timber has always maintained the first place, although its relative importance is diminishing, but cheese and wheat[2] have advanced to the second and

[1] So far no important deposits have been developed in Canada. The Michipicoten deposits in western Ontario and the Moose Mountains deposit at Sellwood, 60 miles N. of Key Harbour at the north-east angle of Georgian Bay, have both proved disappointing, but great hopes are at present entertained with regard to extensive deposits of ore said to be of very high quality beginning about 60 miles north of Kingston, Ont.

[2] An analysis of the special trade in wheat as regards quantity, shows that Canada is on the average of quinquennial periods rapidly increasing its surplus available for export. The period 1886–90 showed the smallest export of domestic wheat and flour since the formation of the Dominion—an average of about 3·8 million bushels per annum, but meantime the imports of wheat and flour for home consumption had been diminishing. Down to 1886 these imports exceeded one million bushels in every year except one, but they have since become a negligible quantity. On the other hand, the average annual export of home-grown wheat in the five years ending June 30, 1906, was 26·2 million bushels, that of flour 1·36 million barrels; in 1908–9, wheat 52·14, flour 1·74.

third places respectively only in the last period.[1] The cheese export shows the importance of the dairying industry especially in the eastern provinces, from which there is also a rapidly growing export of butter,[2] an export which has been greatly promoted by government encouragement to creameries and bounties granted to lines of steamers provided with refrigerating apparatus. Among the **imports** iron and steel goods[3] continue to hold the first place, but there is a diminution in the relative importance of cotton and woollen manufactures.

The **tea and coffee** consumed in the Dominion were both imported chiefly through the United States till after the opening of the Canadian Pacific Railway (846). From the United States Canada also gets large supplies of refined sugar.

869. Since 1879 the foreign commerce of the Dominion has been greatly affected by the increase of the **customs** tariff, with the view of developing local manufacturing industries. The more important **manufacturing industries** are those which consist in subjecting the raw materials of the country to the simplest processes, preparatory to sending the products to a home or foreign market—flour-milling, saw-milling, the manufacture of wood-pulp and various articles made of wood, the making of boots and shoes, and other industries connected with leather—but in recent years there has also been a considerable development of cotton and woollen manufactures and the manufacture of agricultural implements. An attempt was made to stimulate the iron industry of Canada by bounties as far back as 1883, but the most important act with this view was that of 1897, under which bounties were granted on every stage of the iron industry from the raising of the ore to the manufacture of steel. Under this encouragement important iron and steel-works were established at Sydney, N.S., Hamilton, Midland, Sault Ste. Marie, Port Arthur, and elsewhere.[4]

869*a*. A new feature was introduced into the external commerce of the Dominion of Canada by the adoption under an act of 1897 of a preferential tariff in favour of British goods, which from August 1, 1898, were to be admitted on the payment of customs duties 25 per cent. less than those levied on foreign goods. The preferential reduction was afterwards raised to $33\frac{1}{3}$ per cent. from July 1, 1900. The abatement applies not only to the produce of the United Kingdom but also to that of the West Indies, as well as that of any other British colony

[1] The area suitable for cultivation in the north-west is officially estimated at 171 millions of acres (27 in Manitoba, 50 in Assiniboia, 52 in Saskatchewan, and 42 in Alberta), and if one-fourth of this area were in wheat the average production would amount to 800,000,000, on the supposition of an average yield equal to that of Manitoba for the ten years 1894–1903.

[2] Since the minimum year 1889.

[3] Under all important headings by far the larger proportion of such goods now come from the United States. The one item in which the United Kingdom still retains the first place is the rather insignificant one of cutlery.

[4] These bounties cease at the end of 1910 except for wire-rod (fencing wire entering Canada duty free) and pig-iron made by electrical processes.

which has a customs tariff on the whole as favourable to Canada as the reduced Canadian tariff is to it. The abatement has since been made specific.[1]

870. Provinces and Towns.—(1) **Nova Scotia**, a province including both the peninsula of that name and the island of Cape Breton to the north: in all about two-thirds of the size of Scotland. The fertile land, less than half the entire area, is mainly situated in the interior. The **valley of Annapolis** is the most favoured district in respect of soil and climate, and is above all noted for its **apple orchards**. The fisheries of this province furnish the bulk of the Canadian export of fish (**363, 365**). The capital, **Halifax**, on the east coast, is situated at the head of a fine natural harbour, which in most years is free from ice all the winter through. It is the principal naval station of British North America. British troops were quartered here till the first of September 1905. The city and harbour are defended by fortifications. Some iron is smelted at Londonderry in the northern part of the mainland of Nova Scotia, but the most important iron and steel works in the whole of the Dominion have been established at **Sydney** in Cape Breton Island, where coal of excellent quality for smelting purposes and limestone for flux are both found in abundance close beside the admirable natural harbour formed by the Bras d'Or Channel. The ore is obtained from Newfoundland. **Louisburg**, on the east coast of Cape Breton Island, has been connected with the iron-works for use as a winter port.

871. (2) **Prince Edward Island**, about the size of the county of Norfolk, in the bay of the Gulf of St. Lawrence between New Brunswick and Nova Scotia. From the nearest point of New Bruns-

[1] Even though the preference has not been long enough in operation to give a satisfactory indication of its probable ultimate effect, the following figures may be of some interest in connection with this measure. The percentage value of the imports into Canada from the United Kingdom reached its maximum, 58·57 per cent., in 1871–2. After that year there was a pretty steady decline till 1898–9, when the percentage was 24·05. Meanwhile the percentage of the United States had risen from 33·09 in 1871–2 to 60·96 per cent. in 1900–01. In that year, however, more than 50 per cent. of the value of the imports from the United States was duty-free, as against only 26·3 per cent. from the United Kingdom. The duty-free articles from the United States included anthracite to the value of nearly eight million dollars, besides various kinds of lumber and timber, hides, maize, raw cotton, mining machinery, steel rails, crude rubber, and settlers' effects, each to the value of more than one million dollars, whereas the only duty-free goods imported from the United Kingdom to the value of as much as half a million dollars were hides, raw wool, jute cloth, and settlers' effects, none of these reaching the value of one million dollars. The principal textile manufactures of the United Kingdom even with the abatement granted by the tariff as it existed in 1907 were subject to duties varying from 15 to 25 per cent. *ad valorem*, and that on certain woollen and worsted goods of British origin amounts to as much as 30 per cent. *ad valorem*, as against 35 per cent. on those of other origin. In 1905–6 the percentage value of the imports from the United Kingdom was 24·42 as against 59·6 from the United States. (See *Scot. Geog. Mag.*, 1910, p. 180.) A special (dumping) duty is charged in nearly all cases equal to the difference between the selling price for export and the 'fair market value' of the same for home consumption. Under an act of 1903 a surtax of one-third of the duties under the general tariff was levied on imports of German goods, but in return for certain concessions to Canada the surtax ceased from March 1, 1910.

wick it is distant nine miles. Capital, **Charlottetown,** on a large, deep, and well-sheltered harbour.

872. (3) **New Brunswick,** rather less than Scotland in size, very rich in forests, and also possessing valuable fisheries. The capital is **Fredericton,** a small town at the head of navigation for steamers, on the St. John River; but the largest town and chief seaport is **St. John,** occupying a fine harbour on the Bay of Fundy, at the mouth of that river. The harbour is open all the year round, is safe, easy of access, and capable of accommodating vessels of thirty feet draught, and since the port has been connected with Montreal by the 'Short Line,' and more particularly since the subsidising of a line of steamers to Liverpool in 1895, a great trade in live-stock, dairy produce, &c., has been developed.

873. (4) **Quebec,** on both sides of the St. Lawrence, mostly east of the Ottawa, a province twice the size of Great Britain, but the population of which is mainly confined to the small area above indicated (**856**). The winter is long, snow generally covering the ground (sometimes to a depth of more than three feet) from December to April; but the summer is warm enough to grow not merely the ordinary crops of the British Isles, but also maize and tobacco. About four-fifths of the inhabitants of the province are of French origin (**852***a*) and still speak French. Of late years they have even been spreading into the so-called Eastern Townships, on the south bank of the St. Lawrence, where the bulk of the settlers were originally English. Large numbers emigrate to the New England states, where they work in textile factories.

The capital of the province is **Quebec,** situated at the confluence of the Charles River with the St. Lawrence. Once the head of navigation for large vessels, it has had its growth checked by the deepening of the river above the town, and by other causes; for though trans-Atlantic passengers generally prefer to land or start here, goods show their usual tendency in favour of water carriage without transhipment as far into the heart of a country as possible. This circumstance has accordingly favoured the rise of Montreal, now the chief seat of commerce in the Dominion. **MONTREAL**[1] stands on an island in the St. Lawrence, 180 miles (by river) above Quebec. All the improvements in the communications by rail and water above the port tend to increase its shipping and population.[2] (See also **859, 864.**) A railway, 25 miles long, which has been laid to the town rising round the water-power of the Shawinigan Falls is likely to make **Three Rivers** below Montreal a considerable seaport.

[1] Population in round numbers of Quebec and Montreal:—

	1861	1881	1891	1901
Quebec . . .	60,000	62,500	63,100	69,000
Montreal . . .	90,000	141,000	215,000	270,000

[2] In 1906 the ship-channel had a depth of 27½ feet, but the minimum depth is now being increased to 30 feet. The trade of Montreal has been greatly stimulated by the freeing of the Canadian canals from tolls in 1903. In that year nearly 20 per cent. of the shipments of grain from Chicago and Duluth passed through Canadian territory.

874. (5) **Ontario,** more than half as large again as Great Britain, is the province to the west of Quebec, extending along the north of the great lakes. The populous region, which is the most southerly part of the whole of the Dominion, has a much shorter winter than that of Quebec. In the south, wine is produced from native grapes, and a strip running eastwards from Hamilton and bordering Lake Erie, where the physical configuration affords protection against cold winds, is known as 'the garden of Canada,' from its being so peculiarly adapted to the cultivation of table grapes, peaches, and other soft fruits. The district in the vicinity of Lake Temiscaming north-west of Ottawa and that bordering the Rainy River to the west of Lake Superior are two of the more favoured strips in the Archæan region of Canada (857*a*), where agricultural settlement is now going on. **Ottawa,** the seat of the Dominion government, stands on the river of the same name, about ninety miles above its confluence with the St. Lawrence. It is the centre of the lumber trade of the province, and has the largest saw-mills in Canada. The capital of the province is **TORONTO,** near the west end of Lake Ontario, on which it has a fine harbour, and is so situated as to form the centre at which the railways running from the east parallel to Lake Ontario begin to diverge in different directions through what has been called above the Lake peninsula. The town is becoming a great seat of manufactures (agricultural implements, &c.) and is growing as rapidly as Montreal.[1] Iron-works and other manufacturing industries are growing up at the thriving town of **Hamilton** at the west end of Lake Ontario, and there are other iron-works and ship-building yards at **Collingwood** and **Midland** on Georgian Bay, and at **Sault Ste. Marie** are large wood-pulp mills and steel-works utilising by means of electricity the power of the rapids. **Owen Sound** on Georgian Bay is the shipping point of a large farming area. **Sudbury** (867) and **Kingston** (862) have been mentioned already. **Fort William** and **Port Arthur** on Lake Superior are great centres for the shipment of western grain.[2] **Cobalt,** near Lake Temiscaming, in northern Ontario, lies amidst great deposits of cobalt and silver. The chief inland town is **London.**

875. (6) **Manitoba,** the rich, flat **wheat**-growing province in the west, is about two-thirds the size of Great Britain. The capital is **WINNIPEG,** situated at the confluence of the Red River (884*a*) and the Assiniboine, which comes from the west. This town is now also the place of convergence of numerous railways (990), and is hence rapidly increasing in size as the centre of trade for the great wheat-fields of the west.[3]

[1] Population (present area) in 1881, under 100,000; 1891, 181,000; 1901, 208,000.

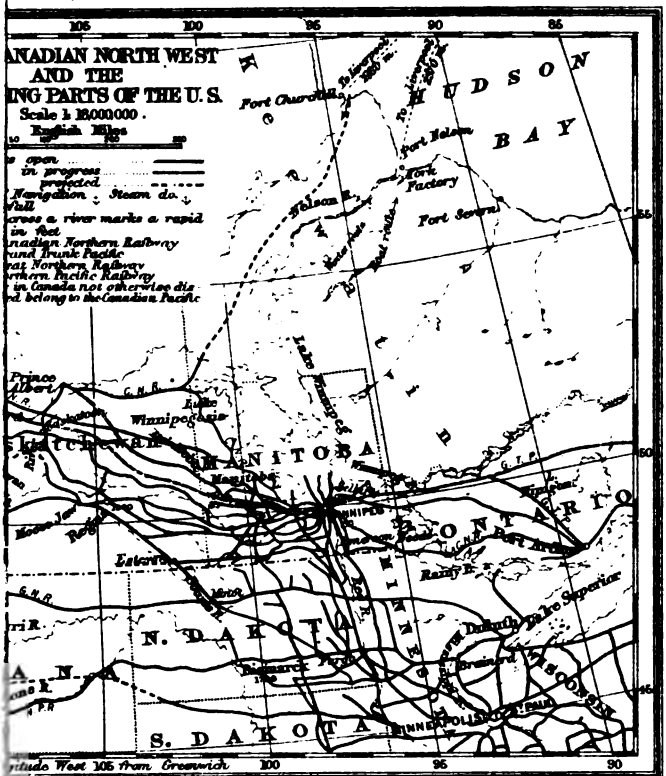
[2] In 1906–7, 64·31 million bushels of grain were shipped from these two lake-ports, against 5·88 millions sent eastward by the all-rail route. A single vessel loaded 380,000 bushels, or upwards of 10,000 tons.

[3] In 1881 the area under wheat in Manitoba was 51,000 acres; in 1902, 2,040,000; in 1903, 2,443,000; in 1908, 2,851,000.

876. The two provinces of Saskatchewan and Alberta, situated between Manitoba and the Rocky Mountains, were created in 1905. (7) **Saskatchewan**, consisting of the greater part of the former districts of Assiniboia and Saskatchewan, together with the eastern half of Athabasca, is mainly a wheat-growing province,[1] especially in the south-east. Its capital is **Regina.** (8) **Alberta**, consisting of the former district of Alberta with the western half of Athabasca and strips of Assiniboia and Saskatchewan, originally owed its settlement to the advantages for cattle-ranching offered by the natural pastures to the east of the Rocky Mountains (858), but is rapidly attracting agricultural settlers who grow more oats than wheat, though even winter wheat is produced in rapidly increasing quantity,[2] no doubt through the favour of the chinooks. In the south sugar-beet is grown under irrigation. The capital is **Edmonton**, at the head of steamer navigation on the Saskatchewan River, and at a point to which, as the map opposite shows, railways are giving increased importance. Coal is mined in this province near Edmonton, at Anthracite and Canmore west of Calgary, and round Lethbridge. In this province, round Banff, is the Rocky Mountains Park, 260 square miles in extent, with numerous hot springs and natural beauties.

877. (9) **British Columbia** is a province four times the size of Great Britain, comprising on the mainland the area from 350 to 400 miles in width between the coast and the Rocky Mountains, composed of high tablelands and lofty mountain-ranges separated by deep and narrow valleys, but also including Vancouver Island and the coastal archipelago to the north as far as the Queen Charlotte Islands inclusive. Its wealth consists chiefly in its minerals, forests, and fisheries (364). The discovery of gold first brought a rush of settlers here in 1856, but the deposits then discovered were worked out. Since 1895, however, gold, silver, and copper mining have all been carried on, on a large scale, in the extreme south along and near the route of the southern branch of the Canadian Pacific Railway. The chief mining district is the Trail Creek division of West Kootenay, where the mining for all three metals in quartz rock is carried on. The principal mining centre is **Rossland.** A bounty is granted by the Dominion government to encourage the smelting of silver and gold, and coal is now largely mined and converted into coke at **Fernie** in the Crow's Nest coalfield for use in the smelters that have been erected in the Trail Creek district. Copper is also mined on Texada Island, where there likewise exist extensive deposits of iron ore as yet unutilised. The oldest coal-mines of the province are those of **Nanaimo** on the east side of Vancouver Island, and others have been opened at **Comox**, further north on the same island. With the aid of irrigation farming and fruit-growing are carried on in the Okanagan valley and some of the other valleys of the

[1] In 1905, area under crop 1,640,000 acres, including 1,130,000 under wheat.
[2] In 1905, total area under crop 416,000 acres, of which 243,000 under oats, 75,000 under spring, and 32,000 (in 1903 only 3,440) acres under winter wheat.



...on New York, Bombay & Calcutta

mainland. **The forests of the coast range,** composed of gigantic pine and fir trees, are among the grandest in the world. The capital of the province is **Victoria,** on a beautiful harbour at the south-east end of Vancouver Island. It has a considerable *entrepôt* trade. Any vessel passing through the Straits of Juan de Fuca will come out of its way to Victoria for a shipment of fifty tons. **Esquimalt,** on an excellent harbour adjacent to that of Victoria, has an arsenal and the largest graving dock on the Pacific coast. **Vancouver,** whose harbour, at the mouth of Burrard Inlet, has a depth of 27 to 30 feet alongside the wharves, and **New Westminster,** near the mouth of the Fraser River, are the two western termini of the Canadian Pacific Railway. The name of **Prince Rupert** has been selected for the new port to be established on Kai-En island a little to the south of Port Simpson, as the terminus of the Grand Trunk Pacific Railway. It is about 3,860 nautical miles from Yokohama. (Compare pp. 464 and 466 *n.*)

877*a*. Northern Canada. The remainder of the Dominion is divided into the districts of Ungava (east of Hudson's Bay), Keewatin and Mackenzie, and the territory of Yukon. They all yield furs, and the **Yukon** territory is rich in gold. It is here, not far from the Alaskan frontier, that the **Klondike** goldfield, with **Dawson City** at the confluence of the Klondike with the Yukon, only about two degrees south of the Arctic Circle, as its centre, was discovered in 1896. The region is difficult of access, but not so difficult now that a railway leads from Skagway over the White Pass to a navigable river of the Yukon basin. The gold occurs both in alluvial deposits and in quartz, but the most easily worked deposits are exhausted.[1]

878. B. Newfoundland, a British colony, to which belongs not only the island of that name but also the dreary coast of **Labrador.** The present population is chiefly composed of fishermen, settled on the coast. (See also **363, 372.**) The island is known, however, to be rich in minerals, especially coal and iron, as well as in timber, the **coalfields,** situated in the south-west, being a continuation of those in Cape Breton Island. A railway has been made from **St. John's,** the capital of the island, on the east coast, running through the coalfields as well as through country well adapted for agricultural settlement, to the west coast. **Iron ore** of excellent quality is now mined with remarkable ease on the small island known as **Bell Island** in Conception Bay within twelve miles of St. John's. Forty million tons of ore are estimated to be in sight. There are large paper and pulp mills at Grand Falls.

C. The Bermudas, a group of small islands about 750 miles to the south of Nova Scotia, producing tropical and temperate fruits and vegetables, and frequented by invalids for the sake of their equable climate.

[1] The production of gold in the Yukon district increased from a value of about 60,000*l.* in 1896 to 500,000*l.* in 1897, and 4,450,000*l.* in 1900, then decreased to less than 1,000,000*l.* in each of the three years 1907–9.

UNITED STATES

879. The territory belonging to the United States, exclusive of Alaska, extends over an area of about three million square miles, or more than thirty-three times the area of Great Britain. Physically this territory is a continuation of that of Canada. In the west the mountains of British Columbia are prolonged into Washington, Idaho, and Montana. In the middle the plains and prairies are similar in the two countries, and the eastern highlands form the northern extremities of the Appalachian system. All but a small fraction of the population of the United States is of non-American origin, being composed either of immigrants or descendants of immigrants from Europe, or of descendants of African negroes originally introduced as slaves on the southern plantations. It is in a large measure due to this cause, and to the fact that the development of the population has from the first depended in a great measure on commerce with Europe, that the density of population is greatest in the east, and above all in the vicinity of the great seaports from Massachusetts Bay to Chesapeake Bay.

880. At the present time there is no other region in the world with so vast a field for immigration under the now existing economic conditions, and hence no other state has its population steadily reinforced by so abundant a stream of foreign settlers. In the ten years 1877–86 the total number of immigrants was upwards of 4,200,000, and in one year (1882) the number approached 800,000. In two years the number of immigrants from Europe exceeded 600,000. The United Kingdom has usually furnished the largest contingent of immigrants from the earliest date from which statistics are obtainable, but since about the middle of the nineteenth century the German quota has in most years approached, and occasionally exceeded, the British.[1] A large number of the non-European immigrants are from

[1] In recent years a change has taken place in the character of the immigration. In the five years ending June 30, 1891, the United Kingdom and Germany together furnished rather more than 50 per cent. of the sea-borne immigrants (steerage passengers); in the five ending June 30, 1901, less than 18½ per cent.; the contingents supplied by Austria-Hungary, Italy, and Russia (including Poland) in the same periods were equal to 29½ and 64 per cent. of the total respectively. There was a great decline in the total volume of the immigration in the second period—from about 2,496,000 in the first to about 1,710,000 in the second of the two periods. The

Canada, and hence in the first instance likewise of European origin. Chinese immigration was at one time considerable, but is now practically prohibited. The **negro population**, though not recruited by immigration, is multiplying rapidly by natural increase [1] (excess of births over deaths), but the small native **Indian population** is dwindling away or becoming absorbed. Since the extension of railways and the improvement of other means of communication facilitating commerce over great distances, large numbers of this immigrant population have settled in the fertile lands or the mining centres of the western states, which are likewise attracting a still greater number of inhabitants from the earlier settled states in the east. **The centre of population** of the United States **has advanced** about one degree of longitude, or more, **westwards** at every decennial census since 1810.

881. In relation to the commerce of this vast region, it is highly noteworthy that there are special **circumstances** both in the history of the country and in the physical features of its territory, **that have favoured the unity of its government.** In consequence of this unity there is free trade here, as in the Dominion of Canada, from ocean to ocean; and though the individual states have each legislative powers within certain limits, there could be no more striking illustration of the importance to commerce of the central government than the passing, in February, 1887, of the **Interstate Commerce Act**, which may be briefly described as an act prohibiting local and individual preferences on the greater highways of commerce throughout the length and breadth of a territory four-fifths of the size of Europe. On the other hand it is to be borne in mind in connection with commerce and industry that labour legislation is a matter assigned to the individual states, one consequence of which, for example, is that in some parts of the south cotton-mills are able to make use of the labour of children, some only eight years old, under conditions that would not be tolerated in Massachusetts or in any of the advanced industrial countries of Europe.[2] The seat of the general government is **WASHINGTON.**

882. If we look at this unity of government from an historical

last two censuses of the nineteenth century showed a diminishing rate of increase of the total population, as is shown by the following table:—

Rate of increase of population of the United States, per cent. per annum.

1850–60	1860–70	1870–80	1880–90	1890–1900
3·09	2·07	2·66	2·24	1·90

[1] In 1900 the negro population of the United States (almost confined to the south-east) was 8,841,000, as against 7,489,000 in 1890, showing a rather slower rate of increase than the general average of the population.

[2] See T. M. Young, *The American Cotton Industry*, pp. 69, 71-2, 112–13; compare also the note on p. 26 in the same book.

point of view, there are several important considerations to bear in mind. The separate 'plantations' or colonies that ultimately formed the first United States grew up independently from several convenient starting places, like the Australian colonies and the republics of South America. They grew up under English influence indeed, and with a common language, but this would not in itself have sufficed to make them one, and it was perhaps fortunate that when they had become strong enough, they were united in a common war against the mother country; fortunate, too, that, when that war was over, the common burdens which it entailed necessitated a common government, and that the great state thus formed held such a preponderance in the middle of the continent that it easily acquired in course of time all the present territory by purchase or conquest. And it was likewise fortunate that, when the practice of slavery in the southern states threatened a permanent division, the North should have been strong enough, in virtue of its more rapid development by immigration, to conquer the South by mere force of wealth and numbers (1861–65). In the course of this war the slaves of the seceding states were declared free by proclamation of the President of the republic, and immediately after the conclusion of the war an amendment to the constitution of the United States abolishing slavery throughout their territory was duly adopted.

883. **Physically the circumstance most favourable to union** is the fact that the central region is one great plain communicating freely with other plains and lowlands in the east, and in the west sloping imperceptibly up to the tableland which forms the base of the Rocky Mountains, and that this great central plain is traversed by some of the grandest navigable rivers in the world. The eastern and larger portion of this central region, from about 100° or 101° W., has a fertile soil and adequate rainfall, so that everything has combined to favour continuous and progressive settlement. As settlement went on every part of it has had the great advantage of easy communication with other neighbouring settled districts.

884. The **Mississippi**, the great waterway running north and south through this region, is continuously navigable for steamers of considerable size to the rapids below the **Falls of St. Anthony**, on the parallel of 45°, that is, to within four degrees of the northern frontier. It traverses a region in which the products of temperate and tropical climates are brought closer together than in any other part of the world, and before the introduction of railways formed the principal channel of communication between districts with the diverse wants due to diversity of production. Even yet, it need scarcely be added, it is of high importance as an auxiliary and rival means of communication. 'During the navigation season of eight months more freight is floated on the Upper Mississippi [St. Louis to the rapids] than any of the three great trunk lines of railroad carry in a year, and at about

one-third the rate.'[1] In further illustration of the importance of the Mississippi navigation it may be mentioned that a 'tow-boat' (or stern-wheel steamer used for propelling cargo-boats) has been known to proceed down the river from Louisville, pushing before it thirty-seven barges with a total cargo (including that of the propelling steamer) equal to nearly 26,000 tons, and by this system coal is known to have been carried from Pittsburg to New Orleans, a distance of 2,000 miles, at the cost of about 60 cents, say 2*s.* 6*d.* per ton, equal to ·015*d.* per ton per mile.[2]

884*a*. The **Ohio**, the tributary which joins the Mississippi on the left bank from a populous region in the north-east, is navigable, with only one interruption, for large steamers for six or eight months in the year, as high as Pittsburg (in about the same latitude as New York), where the river is formed by the union of two other navigable streams. The one interruption referred to is in the form of rapids, avoided by a short canal at **LOUISVILLE**, and for small steamers these rapids are not insurmountable. The **Cumberland** and the **Tennessee**, on the left of the Ohio, and the **Wabash** on the right, have likewise considerable stretches of navigable water. The **Red River**, the **Arkansas**, and the **Missouri**, the great right-bank tributaries of the Mississippi, are also all navigable for hundreds of miles, the Missouri for more than two thousand miles, steamers being able to ascend it uninterruptedly to the **Great Falls**, about 100 miles below the gorge known as the Gate of the Rocky Mountains. In the same great plain, but outside of the basin of the Mississippi, the **Red River**

[1] *Report on the Internal Commerce of the United States for* 1887, p. 27.

[2] *U. S. Census*, 1890, 'Report on Transportation Business,' Part II. p. 410. From the same report it appears that the goods traffic on ordinary steamers is decreasing in consequence of railway competition, but the tow-barge traffic (in bulky goods of small value) increasing, or was so down to 1889, as is shown by the following figures:—

Water traffic, Mississippi basin

Tons of freight moved (thousands)

	Year	Total	On steamers	On tow-barges
Total Mississippi valley	1880	18,947	13,558	5,389
	1889	29,405	10,346	19,060
Ohio . . .	1880	11,739	9,217	2,522
	1889	16,042	3,807	12,235

I have not been able to ascertain whether any report has been published giving corresponding data based on the census of 1900. But even though the railways are proving successful in their competition with the river in general steamer traffic, the wide-reaching importance of this waterway in the transport business of the United States should not be underrated. Mr. M. C. Markham, assistant traffic manager of the Illinois Central Railroad Company, said in some evidence he gave before the United States Industrial Commission in April, 1901:—'The complexities and necessities which confront railroads in rate-making are such as to make this river's influence [that of the Mississippi] almost conterminous with the Rocky Mountains on the one side and the Atlantic on the other.'—*The Times*, April 14, 1903.

of the North, which flows northwards into Canada, is navigable for steamers to Fargo, a point about 200 miles in a direct line from the limit of continuous navigation on the Mississippi.

885. The **Appalachian Mountains** in the east, and the **Rocky Mountains**, and other chains in the west, form an **interruption to communication** in this, among other ways, that they cause the rivers which cross them to have their navigation interrupted by rapids. It is partly on this account, partly on account of their smaller size, that the rivers of the Atlantic coast are of less importance than those of the great plain as navigable streams; but it must be remembered that some of them (the **Hudson, Delaware, Susquehanna, Potomac**, and **James River**) are of great value to commerce, as forming, like the rivers of the British Isles, fine harbours in their estuaries; and the **inland navigation of the Hudson**, a broad, deep river, navigable for large steamers to the latitude of the Catskill Mountains, for smaller ones to the falls at Troy, is of great importance, and was the first cause of the growth of the greatest of all American seaports (New York).

886. The **Columbia River**, the principal navigable stream belonging to the Pacific drainage of the United States, has its navigation frequently interrupted by **falls and rapids**, and so too has its chief United States tributary, the **Snake River**. On the main stream, the lowest interruption of this nature is the **Cascades**, 165 miles from the mouth, but costly works now allow of navigation being continued past this obstruction.

887. The obstacles presented to the laying of **railways** by the great mountain chains in the east and west are less perhaps than might have been expected from the extent and height of the mountains. The gradual slope of the ground up to the base of the Rocky Mountains has facilitated the laying of railways to the foot of the passes, and several routes have been discovered along which railways could be advantageously laid across these and other western mountains. A comparison of the three most important of these routes with the great Canadian route is given under Canada (**864**); and here it may be added that the **Californian valley**, physically the most isolated of all the more productive regions of the United States, is now connected by rail with the rest of the country by lines laid across the mountains on the north, east, and south. Eastward runs the first of all transcontinental railways of America, the Union and Central[1] Pacific, which was completed on May 10, 1869. Northwards, a line of railway (completed in 1887) connects the Californian valley with the railways terminating in Puget Sound. Southwards runs the Southern Pacific Railroad, which directly unites San Francisco with Galveston and New Orleans, and has connections on the one side with the middle states and on the other side with Mexico (see map opposite p. 472, and the map on p. 501).

[1] Now a part of the Southern Pacific Railroad system.

888. In the case of the **Appalachian Mountains** (that name being now used as a general term for all the mountain ranges in the east), it is an important physical feature of the United States that in the north-east, precisely where population is densest, mineral wealth most abundant, the connections between east and west most important, **that system breaks up into a great number of smaller mountain ranges with many gaps between them,** facilitating railway and canal construction. To this region belong several of the most important **canals** of the United States, among others the Erie and Champlain canals. The **Erie Canal,** laid through the Mohawk valley, serves to connect the navigation of the great lakes with New York, starting from Buffalo, at the eastern end of Lake Erie, and proceeding eastwards to Troy and Albany on the Hudson. It was opened in 1825, and the fact that it was the means by which wheaten bread first came into general use in a large part of the eastern states, which was ill-fitted for wheat cultivation,[1] will serve to give an idea of its importance at that date. New York then first came to exceed Philadelphia in population. The **Champlain Canal** connects the eastern end of the Erie Canal with the head of Lake Champlain, and thus completes the waterway between New York and the St. Lawrence.

888*a*. Since the construction of the Erie Canal the fertile lowlands of the Mississippi basin have had the advantage of two great waterways in communication with the ocean, and more or less competing with one another and affecting the competition of railways running in different directions. This may be illustrated by an account of an important part of the trade of **ST. LOUIS,** the great commercial centre on the Mississippi, a little below the confluence of the Missouri. Here reside the merchants who handle a large part of the grain grown in the region to the west, including eastern Kansas and Nebraska. The nearest port for that grain is Galveston, from which probably the bulk of it is sent, but if the railways running south to that port become congested, and are consequently disposed to charge too high rates, the merchants can apply for rates by rail or river to New Orleans, by rail to Baltimore or some other eastern port, or partly by water by the route here spoken of to New York. The grain traffic by the Erie Canal is indeed rapidly declining,[2] but, as explained in n. 2, p. 477, this

[1] In 1886 the New England states, containing about $\frac{1}{12}$ or $\frac{1}{13}$ of the population of the country, produced only $\frac{1}{370}$ of the wheat crop.

[2] In 1886 the cost of carriage of a bushel of wheat from Chicago to New York was 16·5 cents by an all-rail route, 12 cents by lake and rail, and only 8·71 cents by lake and canal. In that year upwards of 45 millions of bushels of grain and flour were carried through the Erie Canal. In 1900, the corresponding rates were 9·98, 5·05, and 4·42 cents, but meanwhile the grain traffic had sunk to small proportions. The total movement of wheat on all the New York State canals (of which the Erie Canal is one) declined from 37·6 millions of bushels in 1862 to 4·6 millions in 1900 (in 1898 it was only 2·3 millions). As no tolls for navigation are charged on the New York State canals, and the Erie Canal is seven feet deep and adapted for barges of 250 tons, there could be no more striking proof of the

does not prevent it from having a great influence on the cost of carriage.

888*b*. The physical features that favoured the construction of the two waterways from New York, mentioned in par. 888, are now of the greatest importance for the railway connections of that port. The Hudson and Mohawk valleys allow of railway connections with easy gradients between New York and Chicago, and at one time this was the only route for the great expresses between these two cities, even although in following this route one has to run for 140 miles north before turning westwards. This route still competes easily with the more direct but more difficult route through the Alleghany Mountains. It is these physical features which no doubt have enabled New York to beat Boston in competing for the bulk of the traffic with the important hinderland of which Chicago is the centre. Boston is cut off from that hinderland by the Hoosac Mountains in the west of Massachusetts, through which there was no railway tunnel till 1875. Even now that route appears to be a difficult one, for a large part of the traffic of Boston with the west passes through New York. While the Hudson and Mohawk valleys afford an easy route between New York and the west, the Hudson, Lake Champlain, and Richelieu valleys afford an equally easy route running almost in a straight line due north between the Adirondacks and the White Mountains to Montreal.

888*c*. In the southern part of the Appalachian system, that to which the name of Alleghany Mountains is sometimes confined, the ranges are higher and more continuous, and there is still a stretch of about 400 miles with only one railway across it, and immediately to the west of that stretch there lies one of the most sparsely peopled districts of the eastern states.

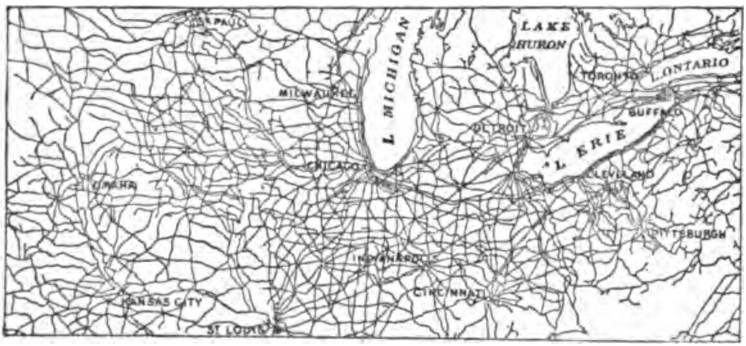
888*d*. The region just referred to is shown in the eastern part of the railway map on the next page. The chief aim of this map, however, is to illustrate the peculiar economic conditions of the United States as compared, for example, with Russia. The map is on the same scale as that of Russia (pp. 312-3). It embraces most of the area of the United States in which the products are similar to those of Russia. This area is everywhere relatively less populous than the most productive parts of Russia, and yet it has a railway network incomparably more intricate than that of the European country with a corresponding industry. The difference between the two in this respect speaks eloquently of the difference between an old agricultural country composed of a multitude of more or less self-contained districts and a new country whose rapid development depends on distant markets, domestic or foreign. The existence of this network, constructed at a time when population was sparse and land cheap, must of

inability of ordinary canals to meet the competition of well-equipped railways, as pointed out above, pp. xl–xliii. The Erie Canal with a slightly modified route is now being made navigable for vessels of 1,000 tons at a cost of 21,000,000*l*.

necessity be of the utmost consequence to the country as population grows denser.[1]

889. With regard to climate, we have in the United States as in Canada to note differences as well as resemblances in comparing different parts of the country with corresponding parts of Asia and Europe in accordance with what is stated in par. **849**. The continuous territory of the United States, that is, the territory belonging to it on the mainland of North America exclusive of Alaska, may be divided into four climatic regions with characteristic products, two east and two west of the meridian of 100° W., though the boundaries must be recognised as more or less arbitrary.

A. The North-east.—North of the Ohio and Delaware Bay, comprising, among others, the New England states. This region



RAILWAY MAP OF A PORTION OF THE UNITED STATES
Natural Scale 1 : 18,000,000

corresponds with the same latitudes of eastern Asia chiefly as regards extremes of temperature. It has not the very dry winters of the corresponding parts of Asia, even though the summer months are on the average the rainiest in the year. In this region the inhabitants are almost all of European origin, and the **products are similar to those of Europe.** The eastern portion of it is the most densely peopled part of the United States, and that in which manufacturing industries are most highly developed. The western half of it is the great maize and wheat-growing portion of the country, the north-west including the Red River valley (**149–150*f***).

B. The South-east, a region in which **tobacco** and **cotton** are grown as staples, and in which **negroes** form a large proportion of the

[1] This anticipation is being more and more verified every year. The growth of the railway system of America under the peculiar conditions here indicated has led to the development of differences in railway management as compared with an old country like England. The nature of these differences is discussed in the Introduction to the Fourth Edition of this work, par. 24.

population, in the states on both sides of the lower Mississippi even outnumbering the people of European descent. Here the correspondence with the same latitudes in the east of Asia as regards rainfall is closer. There is for the most part a decided preponderance of summer rains (39*a*), though the winters are far from rainless. The difference as regards temperature in the parts exposed to northerly winds is already noted in par. 850.

C. **The region between 100° and 120° W.** (mostly tableland), comprising an area of about 1,200,000 square miles, may be described as the **arid region of the United States**, inasmuch as throughout its extent except in the neighbourhood of mountains (39, 717), and near the northern frontier, the rainfall is too scanty for agriculture without irrigation. This region corresponds in the north to the southern part of Western Siberia, and in the south to the arid and almost rainless tracts of Asia forming Russian Central Asia. The part of this region lying east of the Rocky Mountains and sloping gently downwards is known to American geographers as 'the plains.' It is a sheep and cattle-rearing region. The western part, consisting of mountains and tablelands (847), is rich in metals.

D. **The Pacific Coast** has a climate very closely corresponding to that of the same latitudes in the west and south of Europe and northern Africa. In the north the rains are very abundant west of the mountains. As we pass southwards we come to a climate closely resembling that of the Mediterranean region, the summers nearly rainless, the winters mild (39*b*). The chief difference is in the rather low summer temperatures due to the prevalence of fogs, especially in the low grounds. Gold, which first attracted a large population to this part of the world, is still an important product, but the fine Californian valley, watered by the Sacramento in the north and the San Joaquin in the south, now teems with wheat, barley, wine, and southern fruits, and excellent wheat is also grown on both sides of the Columbia River,[1] as well as in the valley of its tributary, the Willamette, between the Coast and Cascade Ranges (50). In southern California various fruits and even wheat and barley are grown by irrigation, the water for which is obtained on the uplands by means of canals on the low grounds from artesian wells. The earliest recorded canal was opened in 1835; the first in the Anaheim district in 1856. Nearly all the oranges and other citrus fruits are grown on the uplands, which are less liable to fogs than the low grounds. The fruits of California—oranges,[2] lemons, apples, prunes, raisins (since 1877) and dried peaches—furnish along with wine and wool the great bulk of the eastward traffic of the middle and southern transcontinental railways. On the mountains the forest scenery is highly

[1] East of the Cascades, and mainly to the east of 120° W.

[2] About 60 per cent. of the citrus fruits of California are said to go to points eastward of Chicago.

remarkable. Dense forests of giant conifers cover the slopes, and a great timber trade has grown up round Puget Sound (Washington), at **SEATTLE, Tacoma, Bellingham,** and other ports.

890. The products and deficiencies among the products of the United States will be most conveniently studied with reference to the tables on pp. 594–7 and 613.[1] But in examining these tables from this point of view, two considerations must be borne in mind. In the first place, the foreign commerce of the country is greatly affected by the maintenance of a **customs tariff**[2] calculated to foster native industries, in consequence of which there is an immense amount of manufacturing industry for home consumption of which these tables give no idea. Secondly, it must not be inferred that because certain agricultural products are largely imported into the United States, they are unsuited to the climate. The high price of labour in the country excludes or limits the production of certain commodities, such as sugar (**305**), tea (**278**), and raw silk (**222**), for which the climate of the United States in some part of their territory is in no way unsuited.

891. The table of special exports on p. 613 suggests the inference that the United States is still on the whole pre-eminently an agricultural country, and this is true notwithstanding the immense increase in recent years in the number of those engaged in manufactures and mechanical and mining industries. The **chief crops** of the United States, **maize, wheat, cotton, oats, barley, rye, buckwheat, tobacco,** are all treated of separately elsewhere, but some further particulars may be most appropriately given in this place.

892. The order in which the crops have now been mentioned is the order of their importance as regards the extent of ground which they cover. In all the leading crops of the United States, a **westerly movement of the centre of production,** corresponding to that of the centre of population (**880**), has been going on for many years back. The unfavourable circumstances affecting the cultivation of wheat

[1] During the American Civil war (1861–65), and after that period down to 1879, the currency of the United States consisted of inconvertible paper, which circulated at a varying discount. While that currency lasted, the export tables were made up partly in terms of the value of the paper dollar, partly in terms of the gold value, and from the annual reports of the trade of the United States it is impossible to tell what proportion is entered on the one basis and what on the other. It seemed accordingly not worth while to calculate the quinquennial averages for the exports of that period in the same way as has been done for other countries. Instead of that the calculation has been made for individual years in accordance with the average value of the paper dollar for the year. The figures got by this method must be somewhat inaccurate for the reason just stated, but they are at least a nearer approximation to the truth than if the conversion had been made at the usual rate. The averages for the total value of American commerce given on p. 595 are based on the gold values given in the Statistical Abstract for the United States.

[2] In 1890 the McKinley tariff, a highly protective one, was enacted. In 1894 this gave place to the less rigorously protective Wilson tariff, but this in turn was set aside in 1897 for the Dingley tariff, which in some respects is more severely protective than the first-mentioned. The Payne tariff came into operation in 1909.

generally (145–9) have caused the area under wheat in the United States as a whole to remain practically stationary for many years,[1] the area under maize growing all the more rapidly. The extent of land now occupied by this crop is about twice as great as that under wheat, and its produce is about three times as much as that of the latter. The much smaller export of maize than of wheat is due to the fact that the bulk of the former crop is employed in the United States in feeding swine and other animals, so that the export of bacon, hams, lard, cattle and beef, as well as maize, may all be regarded as representing this branch of American agriculture.

892*a*. The **wood** export of the United States takes place from Puget Sound (**889 D**), Pensacola, New York, and various other ports. Pensacola, 55 miles east by south of Mobile, is the chief place of export of pitch-pine from the sandy 'pine-barrens' of Florida and the neighbouring states.

893. The **living animals** exported from the United States are chiefly **cattle**, and these, as well as cheese, are mainly the produce of the states east of the Mississippi, and near the northern frontier west of that river; and it is in these regions that this branch of agriculture is most rapidly developing. It is in the western states and territories, however, that **sheep** are multiplying most quickly, the drier climate there prevailing being favourable to the rearing of that animal.

894. With regard to the **agricultural deficiencies** of the United States, which the import table on p. 613 betrays, attention may be drawn to two, **sugar and fruits. Sugar**, it will be observed, has held the first place among the imports of the United States from the earliest period entered in the table, 1861–65; the cause of which is already explained in par. **890**. The ordinary **fruits** of the colder temperate climates flourish in the United States as well as in any part of the world, and are produced in sufficient abundance to leave a surplus for export. The imported fruits are principally those of the Mediterranean region, **oranges**, figs, grapes, currants, raisins, &c.; of these a large supply is now home grown in **California (889, D)**.[2] A great deal of rice is grown in the swamps of Louisiana and other south-eastern states, and an upland variety in Louisiana and eastern Texas.

895. Of the **mineral products** of the United States, the only one that takes a leading place **among the exports**, besides the **precious metals**, is **petroleum, or** mineral oil; but these items give no idea of the extent of the mineral resources of the United States. The fact is that besides the precious metals and petroleum, the United States now produce more iron, copper, and coal than any other country.

[1] There were fluctuations in the wheat area, but on the whole no advance between 1880 and 1896, but after that there was a rapid rise from 34,600,000 acres to 44,600,000 acres in 1899, but in 1900 again a decline. In 1903 the area was 49,465,000 acres.

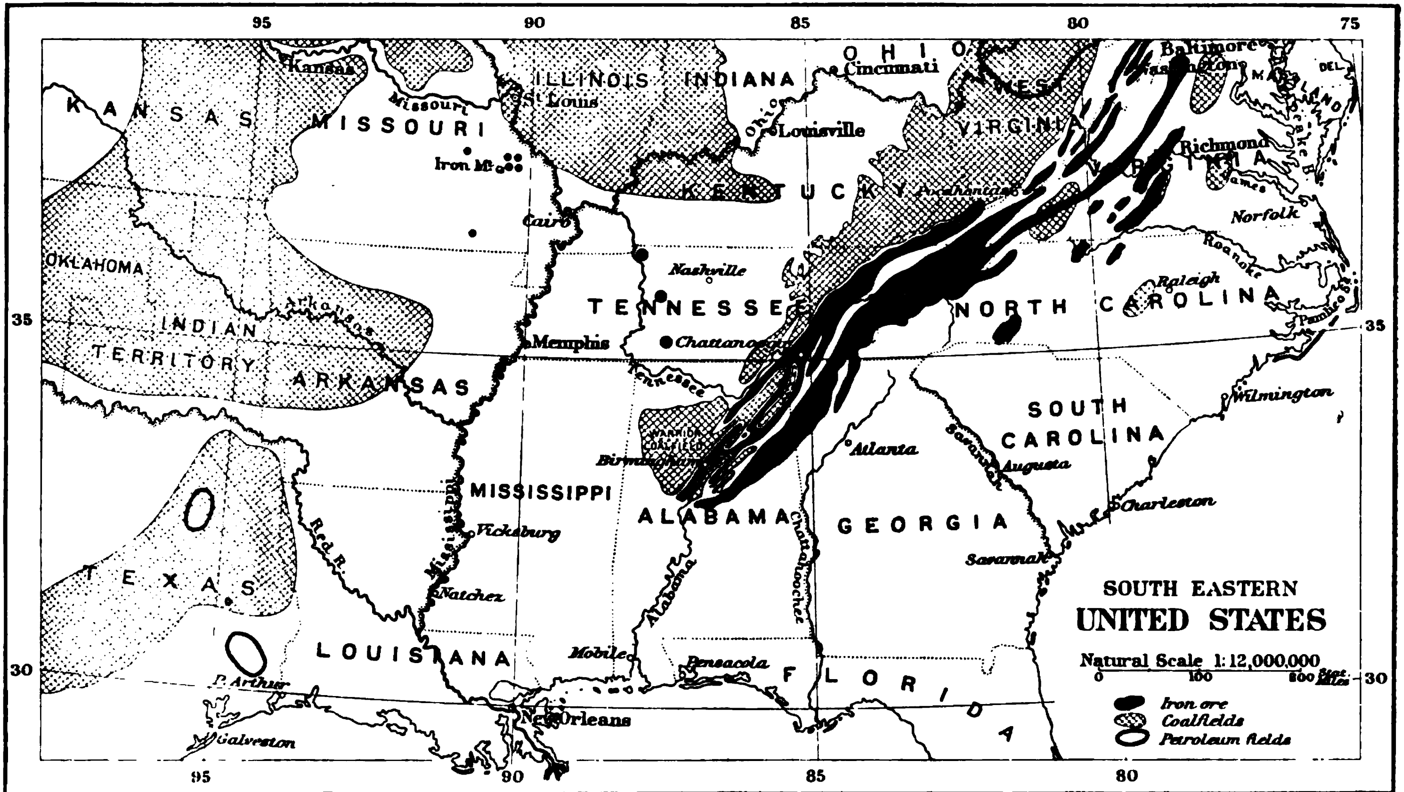
[2] Severe winters (850) have destroyed the former orange groves in the south-east.

896. Coal is produced both in the form of anthracite and bituminous coal, as well as lignite. The total production has been increasing with very rapid strides. The production of 1886 was more than three times that of 1870, and more than seven times that of 1860.[1] Of both the principal forms of coal, the **chief producing state is Pennsylvania,** which yields 60 per cent., or more, of the total quantity produced in the country. **Anthracite** is produced in several small fields in the east of the state, the centre of the region of production being about 200 miles from New York and 125 miles from Philadelphia. Access is afforded to the productive region by the valley of the **Delaware,** with those of its tributaries, the **Schuylkill** and **the Lehigh,** and in all of these valleys there is water communication (by canal or river), as well as, of course, abundance of railways. **Bituminous coal** is produced chiefly in the west of Pennsylvania, the large manufacturing town of **Pittsburg** being situated about the centre of production. To this region belongs most of the coal used in making **coke** in the United States; the principal centre of coke-making being **Connellsville,** about 40 miles south-south-east of Pittsburg. The bituminous coal region of western Pennsylvania likewise extends into the adjoining states of West Virginia and Ohio, in the latter of which large quantities of coal are produced in the neighbourhood of the Ohio River. The **Pocahontas** coalfield, on the borders of Virginia and West Virginia, supplies an excellent steam-coal. Further west another productive coal region extends from the west of Indiana through Illinois to the east of Iowa; and **Illinois** is the state that ranks after Pennsylvania in the total amount of its production. Among the Appalachian ranges in **eastern Kentucky and Tennessee, and northern Alabama,** are other coalfields with a rising production, and many others are scattered over different parts of the United States territory.

897. The **iron-ores**[1] of the United States are likewise very abundant and very widely distributed. Many of them also are of excellent quality. But the chief supplies of ore are at a great distance from the smelting fuel. Nowhere in the country are the best steel-making ores found in proximity to smelting coal; and in some parts of the Lake Superior region, which in recent years have yielded fully three-fifths of the iron ore produced in the United States, even timber suitable for making charcoal is almost wholly wanting.

897*a*. Of the iron-ore ranges near that lake shown in the map on p. 465 the first discovered was the **Marquette Range** in Michigan. It has been worked since the year 1855. The **Menominee Range,** a little to the south, was discovered in 1877, the **Vermilion Range** in Minnesota in 1884, the **Gogebic** in Wisconsin in 1885, and the **Mesabi** in Minnesota not till 1892. This last discovery is the most important on

[1] The principal coalfields and iron-ore fields are shown in the maps on pp. 465 and 486, and the recent increase in the coal and iron industries of the United States is discussed in the Introduction to the Fourth Edition, pars. 16, 19.



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account of the extraordinary facility with which the ores can here be worked. The deposits were originally covered merely with a skin of glacier drift. This having been removed railway lines are laid to the ores, and these having been loosened by blasting when necessary, are then dug and loaded on the trucks by steam-shovels.[1] It is in a large measure the development of these and other mineral areas, together with the development of the wheat region of the Red River Valley (875), that has led to the increase of traffic through the Sault Ste. Marie canals (859).

898. For **smelting**, the general rule prevails in the United States, as elsewhere, that the ore is brought to the fuel, rather than the fuel to the ore; the cost of carriage being relatively less in the more valuable commodity. It is for this reason that the great centre of the iron industry of the United States is **PITTSBURG**, which in the early stages of the industry had the advantage of local supplies of ore as well as coal; and has likewise the advantage of being situated where two navigable streams unite to form the Ohio.[2] Some of the local supplies are long ago exhausted, and their total amount is scanty, but Pittsburg still has the advantage of **fuel** in a higher degree than any other town in the United States; for not only is it within easy reach of the Connellsville **coke**, but it is likewise one of the great centres of the trade in **petroleum** (406). For several years also its iron, glass, and other industries dependent on fuel had the advantage of **natural gas**, which issues from the ground within a radius of from twelve to twenty miles, and is conveyed to the city by pipes, but the price of this gas is now so great that it is mainly used for domestic purposes. Pittsburg produces about one-fourth of the pig-iron made in the United States, and carries on all branches of the iron and steel industry to a greater extent than any other city in the country. The chief supplies of ore to Pittsburg are now necessarily brought from the Lake Superior region, but considerable quantities are

[1] Each of these is attended by five men, and one machine has been known to dig and load 170,000 tons in 26 days, equal to a production of about 1,300 tons per man per day. The average labour cost is about 8*d.* per ton loaded on the cars, but at one mine upwards of 290,000 tons were dug and loaded in 174 days at a labour cost of 2*d.* per ton. The bulk of the miners are Finns, Austro-Hungarians, and Italians.—*For. Off. Reports, Miscel. Series*, No. 583.

[2] Round Pittsburg, iron and steel industries of all kinds are almost as highly centralised as the cotton industry in Lancashire. In 1900 a large number of the most important iron and steel-working companies were united in a great trust with a capital of above 230,000,000*l.* There are no fewer than thirty-eight plants belonging to this trust at different points on twenty-six miles of navigable water (the Ohio, Allegheny, Monongahela, and Youghiogheny) with Pittsburg as a centre, and there are numerous other plants belonging to it on the borders of the states of Pennsylvania, New York, and Ohio between Pittsburg and Lake Erie. The trust also owns vast coalfields, including the Pocahontas coalfield, extensive deposits of ore in the iron ranges in the United States round Lake Superior, railways connecting these ranges with the lake, railways connecting establishments belonging to the trust in and round Chicago, and a railway connecting Pittsburg with the lake-ports of Conneaut (Ohio) and Erie (New York).

likewise derived from eastern Pennsylvania. In the making of glass the employment of natural gas was as beneficial to the quality of the product as in the making of iron, and from the same cause, the absence of sulphur (**382, 387–88**). At a trial of window-glass made from coal and from gas-fuel at Pittsburg it was found that newspaper print could be read through eighteen sheets of gas-made glass placed behind one another, whereas nothing could be seen distinctly through six sheets of similar coal-made glass.

898*a*. Next to Pennsylvania in the production of pig and rolled iron, and the larger **iron manufactures**, comes **Ohio**, whose coalfields are easily supplied with Lake Superior ores; and then **Illinois**, which is readily accessible to supplies of the same ores in the north, and has large coalfields in the south-west within easy reach of the ores of Missouri. In the south-east the iron industry of the United States is most rapidly developing on the coalfield of **northern Alabama**, which is situated in the very midst of enormous supplies of iron-ore suitable for the manufacture of foundry iron but not for steel making. This ore lies in limestone valleys which supply abundance of flux (**388**). From the combination of these advantages, together with that of cheaper labour than in other iron-working districts of the country, this is the district in which pig and cast iron can probably be produced cheapest, and hence there is here growing up with rapid strides a town of **Birmingham**, with similar associations to those of the Birmingham of older and wider fame. In the same state are **Sheffield, Bessemer, Anniston** and other towns engaged in the same industry.[1] Anniston has the most extensive manufacture of cast-iron pipes in the United States. It is this district that might be expected to compete most keenly in foreign countries with the iron-producing districts of Great Britain; but it is an important element in the comparison, that its centre lies, roughly speaking, about four hundred miles by rail from the seaport of New Orleans, about two hundred and sixty from that of Pensacola, on the Gulf of Mexico. An extensive plant for the carrying on of all kinds of iron and steel industries is now being erected by the United States Steel Corporation at **Duluth**, one of the chief shipping points of the Mesabi ores. (See par. **897*a*** and the map on p. 465.)

898*b*. In **New England**, which in colonial days, along with other parts of the Atlantic coast, supplied pig and bar iron to the mother-country, the making of pig-iron is almost extinct, but some of the cities still retain a reputation for their manufacture of iron and steel articles of high quality, such as **tools and cutlery**. It is in the Atlantic States that most of the **imported iron-ore** (nearly all ore of high quality, from Spain, Algeria, and Cuba) is utilised. The principal steel-

[1] Jefferson County, to which Birmingham, Bessemer, and other iron-working towns belong, increased its population from 88,500 in 1890 to 140,400 in 1900.

working establishments on this coast are at Sparrow Point on Chesapeake Bay, nine miles from Baltimore, and at South Bethlehem on the Lehigh River in Pennsylvania.

898c. Notwithstanding the disadvantages of the United States for carrying on an export trade in iron and iron products (except with Canada, and to a smaller degree with other parts of America), the rapid expansion of the iron industry is easy to understand in view of the great development of the American railway system, and the extensive use of machinery of all kinds. And the fact must not be omitted that the United States carry on a large and widespread and rapidly increasing export in certain finished articles containing iron, such as agricultural implements, sewing machines, typewriters, steel bridges, machinery, locomotives, &c. In the manufacture of all these articles the iron and steel manufactures have the advantage from one cause or another of an enormous home market, favouring production on a large scale and by the most economic methods. In ship-building, in which the Americans have not the same advantage, they are still unable, notwithstanding the ingenuity of their labour-saving appliances, to produce as cheaply as Great Britain.[1]

899. The **precious metals** of the United States are chiefly produced among the mountains in the west: **gold** principally on the Californian side of the Sierra Nevada and in Colorado (at Cripple Creek, about the middle of the state, and elsewhere); **silver** principally in the Rocky Mountains, in Colorado, Montana, and Nevada (see also below under copper). As to the production of **quicksilver** see par. **421.**

900. Lime and building stone are too widely diffused for their occurrence to be particularised, and the petroleum production of the United States is treated of elsewhere (**406**). **Copper** is produced most largely in the peninsula of **Keeweenaw**, which juts north-eastwards into Lake Superior (**Michigan**), in the south-east of **Arizona** and in **Montana**. In this last state the copper ore is almost entirely obtained from the small district containing the mining and smelting towns of **Butte** and **Anaconda**, where metallic copper of exceptional purity is produced by the electrolytic process, which yields at the same time considerable quantities of silver as well as gold. The chief lead-producing centre of the United States is **Leadville**, among the Rocky Mountains in Colorado, a town which likewise produces large quantities of gold and silver. Among other important economic minerals of the United States may be mentioned the **phosphate rock of South Carolina, Florida, and Tennessee**, which forms a valuable manure. **Natural gas** occurs not only in the part of western Pennsylvania already referred to, but also in many other places; the places of most abundant production next in

[1] In 1900 only one steel steamship was built in the United States for the foreign trade. In the home trade United States shippers and shipbuilders have a monopoly, and this has now been extended to Puerto Rico.

order being in Ohio, about fifty or sixty miles to the south of the west end of Lake Erie, and in Indiana, near the middle of the eastern frontier.[1]

901. There is only one metal of importance in which the United States are almost entirely deficient, and that is tin. Tin ores are indeed known to exist among the Black Hills (Harney Peak), in the west of South Dakota, but it has not yet been proved whether these can be economically worked. Hence the large import of tin and tinplate;[2] the latter being a much-needed commodity in consequence of the large employment of tin packing-cases for American products of agriculture.

902. With regard to the manufacturing industries of the United States in general, it is noteworthy, in the first place, that they are to a very large extent carried on with the aid of water-power. The total amount of water-power theoretically available in the United States has been estimated at upwards of 200,000,000 horse-power on an average throughout the year. Among the manufacturing towns which benefit by the presence of water-power (in some cases called into existence by its presence) may be mentioned Lowell, Fall River, and Waltham, in Massachusetts; Nashua, in New Hampshire; Paterson, in New Jersey; and Troy, in New York: the last being one of a group of manufacturing towns (including West Troy, Lansingburg, and Cohoes) which have grown up round the falls that interrupt the navigation of the Hudson (885). In flour-milling (152) water-power is used to a very large extent. The Falls of St. Anthony, on the Mississippi River, have been the chief means of making Minneapolis (Minnesota) one of the largest wheat-markets, and probably the greatest flour-grinding centre in the world. Numerous flour-mills are driven by the Falls of the Genesee at Rochester (New York), by the Spokane Falls in the state of Washington, and the Falls of the Willamette above Oregon City, in Oregon.

902*a*. Secondly, though American labour is high-priced, there are compensations to the manufacturer in the quality of the labour.[3] It boasts of being the most efficient in the world, and in respect of the rapidity with which work is done the boast appears to be well founded. But though the best productions of American industry (kept up in a large measure, it must be remembered, by streams of immi-

[1] In 1901 there were 21,848 miles of pipe for the supply of natural gas in the United States, and the quantity produced was estimated to be equivalent in the production of heat units to 8½ million tons of coal.

[2] The import of tin-plate is now perhaps rather to be called considerable than large. The heavy import duties on this commodity first imposed by the McKinley tariff in 1890, aided by the increasing facilities for the production of iron, have at last succeeded in establishing a great tin-plate industry in the United States. The production of tin-plate in the country increased from next to nothing in 1891 to upwards of 399,000 tons in 1901. Meanwhile, the import of this commodity, almost entirely from the United Kingdom, sank from about 325,000 tons to less than 53,000. In 1902, however, the import rose to 88,000 tons.

[3] See n. 1, pp. 229–30.

grants from the most advanced seats of European manufactures) will bear comparison with any in the world, this rapidity is sometimes haste, and hence attended with imperfect workmanship. Serviceable, but not highly finished and not very lasting, is the character of the products of many an American workshop.

902*b*. Thirdly, American **machinery** is **unsurpassed**. It is undergoing constant improvement, through the inventiveness for which the American workman is well known, and which is partly the result of his higher education and higher intelligence, partly the proverbial offspring of necessity.

903. At the census of 1880,[1] the following were the **eight leading industries** as regards the total value of their products: (1) The grinding of grain; (2) the making of leather and articles in leather, including boots and shoes; (3) the making of preparations of flesh; (4) the making of iron and steel; (5) woollen manufactures; (6) the sawing of timber; (7) the making of cast-iron articles and of machinery; (8) cotton manufactures. The seats of the iron industries have already been discussed. All industries employing highly skilled labour, apart from the iron industry, are **mainly carried on** in the regions where the settlements are oldest, the population densest, the manufacturing towns

[1] At the census of 1900 returns as to the manufacturing industries of the United States were collected under various heads. The amount of capital invested in them is, perhaps, the most satisfactory for showing their relative rank, and under that head the following were the first thirteen in order of importance among those producing commodities for distant sale (gas-making being accordingly left out of account): (1) the manufacture of foundry and machine-shop products; (2) iron and steel manufactures; (3) cotton manufactures; (4) printing and publishing; (5) woollen and worsted manufactures; (6) the manufacture of railway carriages and wagons whether in railway works or other establishments; (7) slaughtering and meat-packing; (8) sugar-refining; (9) the manufacture of paper and wood-pulp (unfortunately combined in the returns); (10) the manufacture of agricultural implements; (11) the manufacture of road carriages and wagons; (12) furniture making; and (13) the factory production of boots and shoes. If (1) (2) and (10) in this list be taken together, it is found that the amount of capital invested in industries wholly or mainly connected with iron and steel was about three times as much as that invested in the leading textile industry—cottons. If (6) and (11) are added together, then the manufacturing industries connected with land transportation had the fourth place among the manufactures of the country. Generally it will be noticed that this list shows an advance as compared with the list of 1880 in the degree of manufacturing skill required for the leading industries. If the industries are classified in order according to the amount of wages paid in each or the number of wage-earners, there are some notable changes in the relative rank. Under all these heads, however, the making of foundry and machine-shop products comes first. Iron and steel is second under the head of the amount of wages paid, but third as regards the number of wage-earners, an evidence of the high degree of skill in the wage-earners in this industry. On the other hand, cotton ranks second in the number of wage-earners but fourth in the wages paid, an evidence of the relatively small amount of skill required for the American branches of this industry. In sugar-refining the aggregate wages are low relatively to the amount of capital invested, showing the relatively high value of raw material and machinery; in the furniture trade, on the other hand, this is reversed. The total value of raw materials imported into the United States increased from 189 million dollars in 1890 to 221 million dollars in 1901, the chief at the latter date being rubber, raw silk, hides and skins, tin, and chemicals.

most accessible to immigrant workmen from Europe—that is to say, in **New England**, and the vicinity of the great seaports of New York and Philadelphia. In the making of **cottons** and the factory production of boots and shoes, Massachusetts in 1880 took the lead to such an extent that in the case of cottons it produced nearly half, in that of boots and shoes much more than half, the total value produced in the United States; in the manufacture of **woollens** it had a rival in Pennsylvania, and in that of ready-made clothing New York headed the list. **Cotton manufactures** are now springing up somewhat vigorously **in some of the cotton-growing states**, as in Georgia, North and South Carolina, and Alabama (**259***a*).

With regard to the commerce of the United States in the manufactured goods mentioned in the tables on pp. 595–7 and 613, see the sections on wool (**218**), cotton (**258–9***a*), silk (**236**), flax (**194, 503**). See also india-rubber (**322**).

904. The following list contains the names of some of the **chief manufacturing towns** of the United States, with the specialities for which they are most noted, those being omitted which are mainly concerned with the simplest treatment of raw materials :—

Town	Population		State	Chief Industry
	1880	1900		
Boston	360,000[1]	560,000[1]	Massachusetts	Clothing, sugar
Lowell	60,000	95,000	„	Cottons
Worcester	60,000	120,000	„	Iron wares; boots and shoes
Fall River	50,000	125,000	„	Cottons
Lynn	40,000	70,000	„	Boots and shoes
Lawrence	40,000	65,000	„	Woollens and cottons
Manchester	33,000	57,000	New Hampshire	Cottons, silks
Providence	105,000	180,000	Rhode Island	Jewellery, iron wares
Hartford	40,000	80,000	Connecticut	Iron wares
New York[2]	1,200,000	3,440,000	New York	Clothing
Jersey City[2]	120,000	200,000	New Jersey	Sugar
Newark[2]	140,000	250,000	„	Leather
Paterson[2]	50,000	105,000	„	Silk
Albany	90,000	95,000	New York	Iron wares
Troy	57,000	60,000	„	Iron
Utica	35,000	56,000	„	Clothing
Syracuse	50,000	110,000	„	Clothing
Rochester	90,000	160,000	„	Clothing, boots and shoes
Philadelphia	850,000	1,300,000	E. Pennsylvania	Woollens, clothing, sugar
Reading	45,000	80,000	„	Iron
Scranton	45,000	102,000	„	Iron
Baltimore	330,000	500,000	Maryland	Clothing
Pittsburg	160,000	320,000	W. Pennsylvania	Iron and steel, glass
Allegheny	80,000	130,000	„	Leather, iron
Wheeling	30,000	40,000	West Virginia	Iron
Cincinnati	255,000	325,000	Ohio	Clothing
Cleveland	160,000	380,000	„	Iron
Denver	37,000	140,000	Colorado	Smelting & metal-refining

[1] All the figures are somewhat rounded.

[2] All these towns are in the immediate neighbourhood of New York Harbour. New York now includes Brooklyn on Long Island.

905. With regard to the towns named in this list it must not be supposed that their importance as manufacturing towns is in proportion to the population. **PITTSBURG**, with the contiguous town of Allegheny, is probably the most populous centre dependent mainly upon manufacturing industry (including trade due to that industry). **FALL RIVER** and **Lowell** are the chief seats of textile manufactures. The large towns of the United States, and those which are most rapidly increasing in population, are the great commercial cities (**112–18**), that is, either great seaports with a large foreign commerce, or inland towns which collect and distribute the produce of the west.

906. CHICAGO [1] (Ill.), the greatest of these, is the lake-port for the maize-growing and hog-rearing region to the south-west,[2] but is still more important as lying at the corner of Lake Michigan which must be turned by all the railways bringing the wheat-growing and cattle and sheep rearing region of the north-west into connection with the most populous parts of the north-east of the United States,[3] both circumstances combining to make the town a great centre of attraction for railway traffic in other directions.[4] It is significant that the site of **Gary** (Ind.), the new iron and steel manufacturing town of the United States Steel Corporation, which will draw its coke from the Pocahontas field and its steam-coal from Indiana, has been selected at the extreme south of the same lake, the first point touched in coming from the south-east. **ST. LOUIS** [5] (Missouri), situated a little below the confluence of the Missouri and the Mississippi, and till the last decade of the nineteenth century at the lowest place on which the latter river was crossed by a bridge, has long been the chief town on one of the great western high-roads (**888***a*). **MINNEAPOLIS** and **ST. PAUL** have grown up more recently since wheat-growing became widespread in the north-west. The mills of Minneapolis have already been noticed (**902**). St. Paul arose as the head of continuous navigation on the Mississippi. **CINCINNATI** [6] (Ohio), situated at the north of the great northerly bend of the Ohio River, was the first of the great pork-packing towns. Favoured by excellent water communications, both above and below, as well as by railways, its general business and importance have continued to grow. Other great railway centres are **INDIANAPOLIS** (Indiana); **MILWAUKEE** (Wisconsin), the second in importance of the ports on Lake Michigan and a great focus of German immigration; **OMAHA** (Nebraska), on the Missouri, a little

[1] Population in 1880, 500,000; in 1900, 1,700,000.

[2] In recent years about one-fifth of all the pork-packing of the west has been done at Chicago.

[3] In 1905 Chicago was excelled in receipts of wheat by Minneapolis, Kansas City and Duluth, but it always ranks first in receipts of flour.

[4] Out of 212,349 miles of railway in the United States at the end of 1904, there were 93,934 miles in direct connection with Chicago.

[5] Population in 1880, 350,000; in 1900, 575,000.

[6] Population in 1880, 255,000; in 1900, 325,000.

above the confluence of the Platte or Nebraska River, at the crossing place of the great line of railway from New York to San Francisco; and **KANSAS CITY** (Missouri), at the confluence of the Kansas River with the Missouri.

907. The towns most rapidly increasing in population in the United States are situated principally in the west, and chiefly engaged in handling western products. The case of **Chicago** has long been known. About 1830 a place containing only a few huts, it had in 1880 a population exceeding half a million, and in 1890 it had become the second city in the United States in respect of population, numbering in 1900 nearly 1,700,000 inhabitants, or upwards of 400,000 more than Philadelphia. **Minneapolis** and **St. Paul**, which in 1880 had each a population of less than 50,000, both had in 1900 one of more than 150,000, together over 365,000. The site of **Omaha** was first marked out for settlement in 1854. At the census of 1880 the town had a population of 30,000; at that of 1900, 102,000. **Kansas City** had in 1880 a population of 56,000, in 1900 one of 163,000. **Milwaukee** and **Detroit** during this interval had a growth almost parallel to one another. They each increased from a population of about 116,000 to one of about 285,000. The population of **Denver** in Colorado increased in the same period from under 40,000 to upwards of 133,000. **Duluth** in Minnesota, the Lake Superior terminus of the Northern Pacific Railroad, had in 1875 a population of 2,500, in 1900 one of about 53,000. Being the lake-port for the United States portion of the Red River Valley, its receipts of wheat are already in excess of those of Chicago. It is likewise a place of shipment for some of the iron ores of north-eastern Minnesota (897*a*), and it has already started smelting works for the silver, copper, and lead ores of the region traversed by the railway above mentioned.

908. The chief **seaports** of the United States in the order of their importance in respect of the tonnage of shipping entered and cleared in foreign trade on the average of the five years 1881–85[1] were **New York**, **Boston** (Massachusetts), **San Francisco** (California), **Philadelphia** (Pennsylvania), **Baltimore** (Maryland), **New Orleans** (Louisiana), **Portland** (Maine), **Savannah** (Georgia), **Charleston** (South Carolina),

[1] At the close of the nineteenth century the following were the ten leading seaports in order of importance as determined by the amount of tonnage entered and cleared in the foreign trade: New York, Boston, Philadelphia, New Orleans, Baltimore, Puget Sound, San Francisco, Galveston, Newport News, and Mobile. As compared with the position in 1880 the most notable changes are the decline in the position of San Francisco and the rise of the Puget Sound ports and Newport News. The relative decline of San Francisco in the foreign trade is no doubt to be ascribed to the increasing importance of steamer as compared with sailer traffic and the concurrent development of trans-continental railway traffic. These circumstances have combined to draw away much of the trade of the hinderland of San Francisco to competing Atlantic ports. The rise of the Puget Sound ports is to be ascribed chiefly to the development of Alaska and the Yukon goldfields, and the growth of Newport News (chiefly since 1896) is mainly the result of the increasing export trade in coal from the Pocahontas coalfield.

Galveston (Texas), **Mobile** (Alabama). New Orleans and the last four are the chief cotton ports. In respect of the amount of its foreign commerce New York is without a rival, for on the average of the years mentioned the tonnage entered from foreign countries at that port was 48 per cent. of the whole; that cleared for foreign countries, rather more than 46 per cent. The population of New York, Boston, Philadelphia, and Baltimore is stated in par. **904**. The only others with more than 100,000 inhabitants are San Francisco[1] and New Orleans.[2]

908*a*. The physical conditions present great difficulties in the way of providing commodious harbours at all the ports on the Gulf of Mexico. At the port of **New Orleans** vessels of large size, loading to a depth of from 26 to 31 feet, can make use only of that branch of the delta of the Mississippi which is known as the South Pass.[3] Since the construction at enormous expense of the jetties at that entrance to the river the other arms of the delta have got silted up so that they can be used only by very small vessels. The hinderland of New Orleans is one of the largest in the country, and has been made much more valuable by the development of railways by means of which the great bulk of the traffic is now carried on.[4] The structure of the Appalachian system has facilitated the construction of railways connecting it with New York, but a much more important connection is established by the Central Illinois Railroad with Chicago, 912 miles distant, nearly due north. By this line there is a large trade from New Orleans in bananas and other imported fruit, as well as in garden produce grown in the neighbourhood of New Orleans in the early months of the year (from January onwards), and from July onwards the same kind of produce is carried the other way—from the northern states to New Orleans. **Galveston** has with difficulty been provided with a navigable channel across the bar of a depth of between 28 and 29 feet, and 20 to 25 feet of water at the berths. Having the advantage of being only 2,130 miles from San Francisco, as against 2,480 miles, the distance between that port and New Orleans, it has been made the principal Gulf port of the great railway system of the Southern Pacific Railroad. Large quantities of Hawaiian sugar are now conveyed from San Francisco to Galveston even for New York and other eastern seaports. (Comp. **846** and **864**.) The wharves at **Mobile** can be reached only by vessels drawing no more than 21 feet.

908*b*. Among the minor **seaports** of the United States may be mentioned **Newport** (Rhode Island), **WASHINGTON** (D.C.), **Richmond**

[1] Population in 1880, 234,000; in 1900, 343,000.
[2] Population in 1880, 216,000; in 1900, 287,000.
[3] Improvements are now (1903) being made on the South-west Pass, which is to be made into an outlet for New Orleans with a depth of 35 feet.
[4] In 1901, of the total quantity of goods received at New Orleans nearly 95 per cent. entered by rail, little more than 5 per cent. by river.

(Virginia), a great tobacco port, **Wilmington** (North Carolina), **Pensacola** (Florida), chiefly a timber port, **Wilmington** (southern California), **Portland** (Oregon), a great wheat port of rising importance; **Tacoma** (Washingon), on Puget Sound, one of the termini of the Northern Pacific Railroad. **Pensacola** has one of the best harbours on the Gulf, having a depth on the bar of 32 feet and from the bar to the dockyard of 30 feet, with accommodation at the town wharves for vessels of from 16 to 22 feet. The fisheries and fishing stations of the United States are treated of elsewhere (**363, 364**).

909. The **foreign shipping** at American seaports is **mainly under foreign flags**, the United States flag being represented on the average of the five years 1881–85, by barely 20 per cent. of the whole.[1] By far the largest share belongs to the British flag; those of Germany, Norway, and Italy coming next after that of the United States itself. The chief reason of this inferiority of the native flag in foreign commerce is the fact that no vessel is allowed to be registered as belonging to a United States owner unless built in the United States (comp. **898***c*), and even if foreign-built ships could be so registered the competition of other countries would probably compel the owners to work them with foreign crews.

910. Here it may be stated that this inferiority in the shipping of the United States is part of the explanation of the **large excess of exports over imports**, which the tables on pp. 595 and 613 show to have existed in four out of the five last quinquennial periods, for which those tables have been calculated. The cost of transmarine carriage must be borne to a larger extent by the United States than by foreign countries, and this extra cost is represented by the excess of exports. This, however, cannot be regarded as the whole explanation of the difference there brought out. Part of the explanation may be found in the unrecorded import of specie brought by immigrants (though this is at least partly balanced by similar unrecorded exports), and possibly also the figures now under consideration indicate that there is no longer an excess of money imported for investment in the United States, but that, on the other hand, there is now an excess repaid to foreign countries by way of interest on investments.[2]

910*a*. The United States has two outlying territories, **Alaska** and the **Hawaiian Archipelago** (**969**). Alaska lies to the north-west of the Dominion of Canada, and was acquired from Russia by purchase in 1867. It has an area more than six times that of Great Britain, and is traversed by a magnificent river, the Yukon, but produces commercially little besides **furs** (**352**), **salmon** (**364**), and gold. The **gold**

[1] The percentage of the imports and exports of the United States carried in vessels registered in the country amounted in 1860 to 66·5, in 1870 to 35·6, in 1880 to 17·4, in 1890 to 12·9, in 1900 to 9·3, in 1902 to 8·8, in 1907 to 10·6.

[2] An American commercial paper estimated the total balance annually due to foreign countries on this head about the beginning of the twentieth century at 17,000,000*l*. See Sell's *Com. Intel.*, No. 233, p. 22.

deposits are at Nome on the north side of Norton Sound nearly opposite the mouth of the Yukon, on Douglas Island (the Treadwell Mine), opposite Juneau in 58° 15′ N. (where quartz-mining has long been carried on), and elsewhere. The Nome deposits, discovered in 1898, are by far the most important. Coal is known to exist on several of the islands fringing the mainland to the south of the fifty-eighth parallel of latitude, but is not worked; but in 1903 a report was issued on important seams of a hard bituminous coal discovered at a distance of from 12 to 25 miles inland from Controller Bay just north of the sixtieth parallel, and west of 144° W.

910*b*. The foreign possessions of the United States were mainly acquired in 1898 in consequence of a war with Spain. They consist of the West Indian island of Puerto Rico, the Philippine Islands, the island of Guam, and part of the Samoan archipelago.[1]

[1] Their total population at the end of the nineteenth century (partly estimated partly ascertained by census) was under 8,000,000.

MEXICO AND CENTRAL AMERICA

911. MEXICO. Mexico is a country with a government nominally similar to that of the United States. Its territory, though between eight and nine times the size of Great Britain, is **in the north** a continuation of the **arid and desert** region in the south-west of the United States, and the **densest population** is found on the narrower portion to the south of the Tropic of Cancer, and more particularly **on the tableland of Anahuac.** It will be observed from the map on p. 501 that all the chief towns situated on this tableland are upwards of 6,000 feet above sea-level. Further north the general elevation sinks to between 3,000 and 4,000 feet. Everywhere in proceeding from the coast to the tableland of Mexico, that is, everywhere north of about latitude 18½° N. (see the map on p. 501), one has to ascend a height of more than 3,000 feet within a distance of from fifty to two hundred miles in a direct line, the ascent being greatest and most rapid where the population is densest and communication with the seaboard of most importance. The tableland, moreover, is bordered by mountains, which causes the ascent to be higher than is indicated by the elevation of the towns lying on its surface. On their outer slopes these mountains present to view an extremely diversified surface. Numerous minor spurs enclose larger or smaller valleys at different elevations. The general height of the mountains to the south of the tableland sinks as the mainland narrows to the **isthmus of Tehuantepec,** from which another mountainous region rises as the mainland widens again on the other side. The greater part of the isthmus is under 1,000 feet in height, and in the lowest section across it the highest elevation is below 800 feet. The two **peninsulas** of Mexico contrast with one another in their superficial features. **Yucatan** consists almost entirely of low plains, and is nowhere above 1,000 in height. **Lower California** is a miniature repetition of the mainland of Mexico in so far as it consists of an interior tableland bordered by low coast strips.

911*a*. As might be expected from the character of the surface just described, the **difficulties of communication** have long been one of the chief obstacles to the development of the country. Not many years ago travellers bound from the capital to Acapulco, on the Pacific Coast, were known to proceed first to Vera Cruz, thence by sea to New York, from New York to San Francisco, and thence again by sea to Acapulco, rather than attempt the land journey of three hundred miles. Till

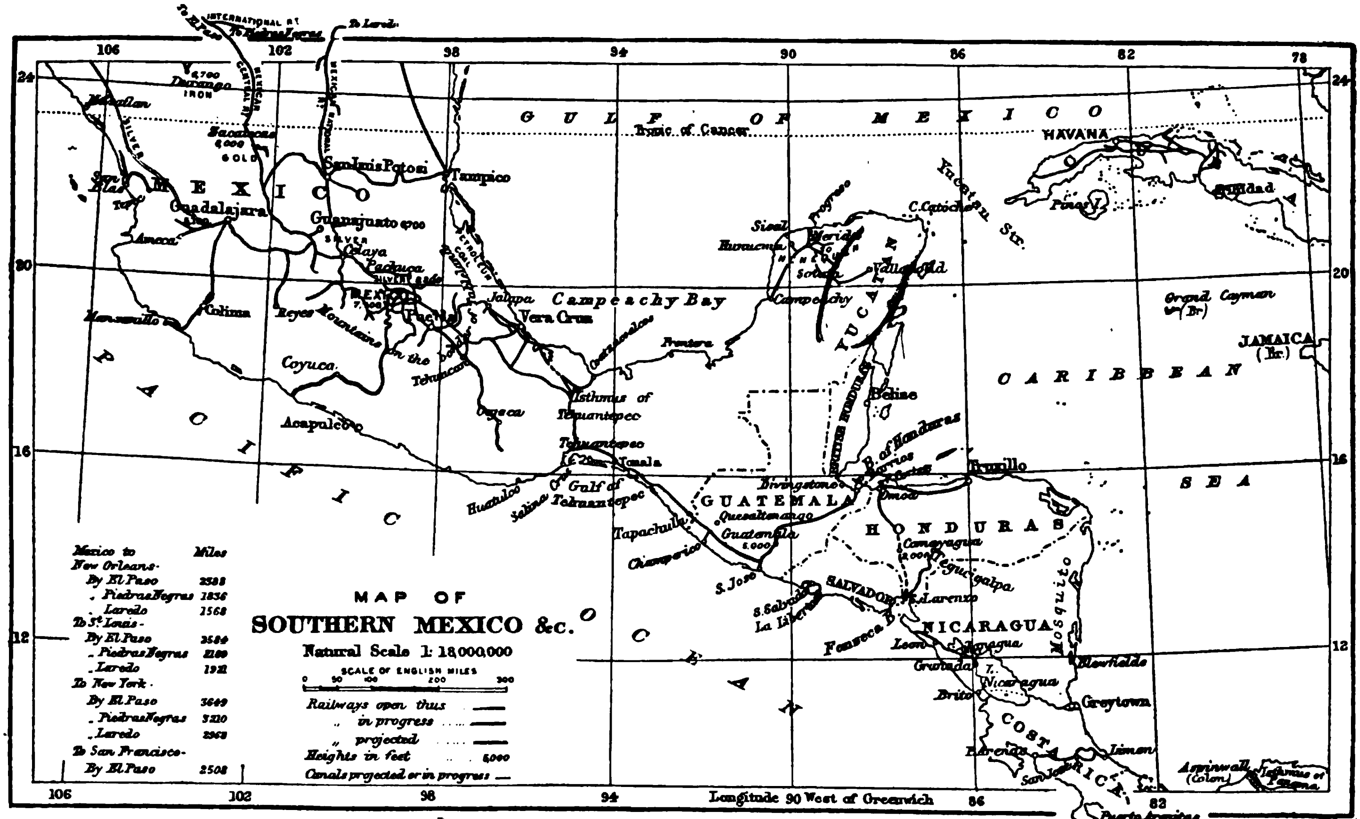
January 1, 1873, when the railway from the city of Mexico to Vera Cruz was inaugurated, there was no railway communication between the interior of the tableland and the sea. Before reaching the plain of Mexico this line has to ascend to a pass upwards of 8,200 feet in height within a distance of about eighty miles in a direct line from the coast. Where the gradient is heaviest on this line only about ten loaded wagons can be drawn up at once. On the surface of the tableland railway construction naturally presents fewer difficulties, and it will be seen from the map (p. 501) and the notes printed on it that there are now three different routes by which the city of Mexico is connected with the railway system of the United States. The first of these railways constructed was the Mexican Central, which forms the direct communication with San Francisco and was opened in 1884. Though railway construction is easier on the tableland than between the tableland and the coast, yet the heights given on the map for some of the chief towns show that the surface even there is far from being level or even presenting a tolerably uniform slope. It is crossed and re-crossed by mountains and valleys, especially in the south, and here and there has somewhat extensive relative depressions. In consequence of this inequality of surface the National Railway (see map) soon after leaving Mexico climbs to the height of nearly 10,000 feet above sea-level before descending into a valley situated about 1,200 feet higher than that of Mexico. The Central Railway passes through Zacatecas at the height of somewhat more than 8,000 feet, reaches a still higher elevation further north, afterwards descends to a valley about 3,700 feet in height, to rise again to a height of more than 4,500 feet, and then to descend once more to the height of 3,700 feet on the frontier.

912. The **climate** and vegetable productions of Mexico vary greatly according to the height and the situation. The low-lying coast strips on both sides of the tableland are mainly marshy tracts with a hot malarious atmosphere such as characterises tropical coasts in most other parts of the world. The hot region, in which bananas and other tropical fruits, sugar-cane, coffee, cacao, tobacco, and vanilla are the principal objects of cultivation, and forests, yielding valuable cabinet and dye-woods, clothe the mountain slopes, extends upwards to about 4,000 feet above sea-level. Between about 4,000 and 4,500 feet is the belt which forms pre-eminently the temperate region, where the climate is that of an eternal spring, and all the products of the warmer part of the temperate zone, including tobacco, flourish luxuriantly. In a wider sense the temperate zone reaches upwards to a height of about 7,000 feet, the elevation at which forests of pines and firs, characteristic of the cold region, become predominant. The so-called cold region, which includes the southern and higher parts of the tableland, is, however, cold only by comparison. Real winter temperatures are experienced only at places situated at exceptionally high elevations. The prevailing crops on the tableland are **maize** (which furnishes

along with a kind of **beans**, the staple food of the great bulk of the population), wheat, barley, and other cereals, and the **agave** or **maguey** (the so-called American aloe), from the juice of which is obtained the favourite Mexican drink called pulque.

912*a*. As regards **rainfall**, the whole of Mexico is characterised by the tropical alternation of dry and rainy seasons, the latter occurring in the summer of the northern hemisphere. On the lowlands and mountain slopes bordering the tableland these rains are abundant, but on the surface of the tableland they are in most parts scanty (**39, 657, 729**). Only in the south of the tableland are they sufficiently copious to maintain a vigorous vegetation. As one approaches the tropic of Cancer the rainy season becomes shorter and the amount of the rainfall at any period scantier. Irrigation becomes absolutely necessary for cultivation. Still further north the climate is even drier. The spiny shrubs and herbs characteristic of arid regions generally constitute almost the sole vegetation. Artesian wells (**62**) have to be sunk to supply the locomotives with water. Only the valleys and hollows above referred to allow of sufficient accumulations of water to render cultivation and the rearing of live-stock possible by irrigation. Some of these hollows, however, produce excellent wheat and other cereals as well as cotton. An extensive relative depression of great productiveness is traversed by the International Railway in the hundred miles before its junction with the Central. This promising region is known as the **Laguna district**. The peninsula of **Yucatan** is too far from the condensing influence of the mountains (**36**) to enjoy a copious rainfall, so that the characteristic vegetation consists of fibre-plants, which thrive in a dry climate, and which are now furnishing a more and more important article of export. The tableland of **Lower California** is of the same arid character as the mainland in the same latitude.

913. Hitherto the wealth of Mexico in **minerals**, and above all in **silver**, and to a less extent in gold (**410**), has furnished the most important Mexican exports. It is these commodities that could best bear the heavy cost of transport. In recent years, the precious metals have made up on an average about seven-tenths of the total value of the exports. The map opposite shows that Mexico has other minerals, but none of them have yet attained a high degree of commercial importance, there being difficulties in the way of their working. Improved communications are required for the working of the petroleum and coalfields marked in the east. A few petroleum wells have been sunk, but were it not for the protection afforded by heavy import duties it is probable that there would be no prospect of commercial success in this project, even though the petroleum line (150 miles in length) is within a distance of from five to fifteen miles of the coast. The **coalfields** lie parallel to the petroleum area, but at a height of from 2,000 to 4,000 feet above sea-level. The deficiency of workable coal is indeed one



Longmans Green & Co., London, New York, Bombay & Calcutta.

of the chief obstacles to the development of Mexican commerce and industry. On the southern railways wood is very largely used for fuel, and the most easily available supplies of this fuel are getting rapidly diminished. The northern railways are in a large measure supplied with fuel from a coalfield outside the border of the map—the **Sabinas coalfield**, which is traversed by the International Railway, in about lat. 28° N. This coalfield is of considerable extent, but at the depth yet reached by the mines it does not furnish a good steam-coal. Another coalfield is known to exist in the north-west of the country, in the basin of the Rio Yaqui, about 100 miles from the coast. The **iron** marked at Durango is in the form of a mountain of ore of unusual purity. The mountain, the Cerro del Mercado, upwards of 8,500 feet in height, is more than six times as high as Gellivara (645), but does not cover so great a superficial area. Durango is now connected by rail with the Mexican International Railway, and large and profitable iron and steel works exist both there and at Torreon, where that railway crosses the Mexican Central. Other works of the same kind exist at Monterey and elsewhere in the republic. Fine marbles and other beautiful building materials are also among the minerals of Mexico.

913*a*. The Mexican **exports** next in value to the precious metals are **dye-woods** and fine **cabinet woods**, **fibres**, chiefly **henequen** (see map and 316), **vanilla**, **coffee**, **tobacco**, hides, and medicinal roots. Sugar and cotton are grown mainly for home consumption. The **imports** are such as characterise undeveloped countries generally—textiles, leather wares, iron wares, and other manufactured goods. It is to be noted, however, that a large amount of raw cotton is imported from the United States, many **cotton factories** having been established to make use of the abundant water-power on the outer slopes of the mountains, chiefly in the neighbourhood of Vera Cruz. The table on p. 598 shows the relative importance of different countries in the foreign commerce of Mexico. It will be observed that the export table shows a great decline in the trade of the United Kingdom relatively to that of the United States. This decline is due mainly to the construction of the railways establishing connections with the railway system of the United States. Though smelting works are being rapidly multiplied in Mexico itself, large quantities of ores are still sent to the United States to be smelted, and the same country receives the largest proportion of the metals when smelted. The import table shows, on the other hand, that the United Kingdom more than holds its own in this branch of the trade, and the improvement under this head may be ascribed to the improvements in the Atlantic ports of Mexico, and more particularly to the establishment in 1891 of railway connection between Tampico and the Mexican Central Railway.

913*b*. The traffic carried by these northern railways is mainly through traffic, originating in or destined for the more populous portions of the tableland. The nature of the climate and the scantiness

of the population are obstacles to the development of commerce with the parts of Mexico nearer the United States frontier. But it is to be borne in mind that there are other parts of the world in which a large commerce is carried on by a relatively scanty population, and wool, the commodity of most commercial importance among those which can be produced by a small population, is one for which the northern parts of Mexico would appear to be well suited, wherever there is a sufficient amount of water. The neighbouring parts of the United States, with a similar climate, have at any rate shown themselves to be well adapted for the rearing of sheep with a fine fleece. No doubt fine-woolled sheep could be reared as well on certain parts of the tableland of Mexico as on the interior pastures of Queensland in corresponding latitudes, if proper attention were given to this branch of industry. The success of the industry commercially would probably depend, however, on the extent of available land sufficiently well watered. Till lately Mexican commerce was hampered by the right of the individual states to levy customs duties on their frontiers, but this right was abolished by a decree of the Central Government in November 1886.

913*c*. Of the **seaports** of Mexico the most important is **Vera Cruz**, where the bulk of the foreign commerce of the country (especially in the import trade) is still carried on. The harbour at this port has been so improved that there is now an average depth of 36 feet at the entrance, and one of 33 feet alongside of the deep-water jetty. Other quays and piers have a depth alongside of 28 feet. **Tampico** harbour, which formerly could not be entered by vessels drawing more than 9 feet, is now accessible for vessels of nearly 24 feet draught, and is well provided with jetties and wharves. **Matamoras**, on the shallow Rio Grande (northern frontier), was an important cotton port during the American civil war, and retained a small shipping trade till the opening of the northern railways, but this trade has now almost ceased. **Acapulco**, on the Pacific coast, has an excellent natural harbour. It is the place from which a galleon used to be dispatched annually laden with silver for the Crown of Spain. Some Pacific steamers call here regularly, but the amount of trade is very limited, and will probably continue to be so as long as the projected railways connecting it with the interior remain uncompleted. **Guaymas**, a port on the Gulf of California (outside the map, in lat. 28° N.), has a good natural harbour directly connected with the railway system of the United States by a line of railway passing through several productive hollows in the province of Sonora. Harbours with a depth of 33 feet and with quays and wharves provided with the best modern appliances for the handling of cargo have been constructed at **Salina Cruz** on the Pacific side and **Coatzacoalcos** on the Atlantic side of the isthmus of Tehuantepec. The railway across that isthmus has also been improved, with the view of making it part of a great trade-route connecting the two great oceans. (See par. **992*c*.**)

913*d*. The city of **MEXICO**[1] is the seat of the general government and the most populous town in the country. Next in population is **Puebla**, which is the centre of a district rich in minerals, including coal and various fine kinds of stone, as well as in vegetable products. Besides Mexico and Puebla, **Guadalajara**, **San Luis Potosi**, and **Leon** have all upwards of 50,000 inhabitants. (See also **123**.)

914. CENTRAL AMERICA. The six republics of **Guatemala**, **San Salvador**, **Honduras**, **Nicaragua**, **Costa Rica**, and **Panama**, the largest of which have an area of little more than half that of Great Britain, have a surface similar on the whole to that of southern Mexico. Their chief products are coffee (for which soil and climate are excellently adapted) and tobacco. Communications, still very defective, are being improved, and concessions have been granted for railways to connect all the capitals, as well as for new lines to cross from ocean to ocean.

914*a*. Panama, which, till it declared its independence on November 4, 1903, formed part of Colombia, contains the only inter-oceanic railway in Central America, and this is the oldest inter-oceanic railway in the world. It is 47½ miles long, connects Colon or Aspinwall in the north with the town of Panama in the south, and was opened on January 28, 1855. A treaty between the new republic and the United States, ratified on February 26, 1904, grants to the United States in perpetuity a monopoly for the construction, maintenance, and operation of canal or railway communication across the territory of the republic, and, with a view to the completion of the canal begun by a French company floated in December 1880, cedes to the United States a zone ten miles wide containing the route of this canal. With regard to this canal and the Nicaragua Canal project see also the Introduction to the Fourth Edition of this work, pars. 45, 46, and pp. 623–4 of the appendix.

914*b*. The west coast of Central America is cliffy, and has the best harbours. The eastern shores are mostly low and swampy, and the harbours generally encumbered by bars. It is on this side, however, that most of the trade is carried on, the British Isles and the eastern ports of the United States being the parts of the world that have the bulk of that trade. The best seaport on that side is **Belize**, the port of **British Honduras**, a Crown colony, with an area about equal to that of the counties of York and Durham taken together, and a population of about 38,000. It is the place of export of a great deal of **mahogany** and other cabinet woods, together with logwood and other dye-woods. The chief of the other ports on this side are **Truxillo** (Honduras), **Bluefields**, and **Greytown** (Nicaragua), Puerto Limon (Costa Rica). From some of these ports there is a growing trade in fruit (bananas &c.) with the United States. (See also **123**.)

[1] Population, 330,000.

THE WEST INDIES

915. This group of islands has an aggregate **area** not much larger than that of Great Britain, with a population of about 5,000,000, the two largest islands, Cuba and Hayti, being very thinly peopled. The larger islands, in the west, are known as the **Greater Antilles**; the smaller islands, in the east, as the **Lesser Antilles**.

916. The **Bahamas** are flat coral islands, the seas surrounding which produce **sponges**. All the other islands are mountainous, and the mountains and higher parts of the surface generally are covered with dense forests, which yield cabinet- and dye-woods to commerce. **Hurricanes** sometimes render the navigation both of the Atlantic and the Caribbean Sea dangerous in the period from July to October, and especially in September, when the sea is at its hottest and the winds are very variable.

917. The **population** is almost entirely descended from natives of other continents, the aboriginal population having been nearly exterminated within a short period after the discovery of the group by Columbus. A very large proportion of the inhabitants are the descendants of **negroes**, originally slaves, but now all free. **Indian** and **Chinese coolies** have been introduced as labourers since the liberation of the negroes, on account of the unwillingness of free negroes to work. The rapid increase of the negro population is, however, gradually doing away with the difficulty of obtaining plantation and other labourers.

918. With the exception of Cuba, which forms a republic under the protection of the United States, and Haiti, which is now divided between the **Republic of Haiti** in the west and that of **San Domingo** in the east, these islands are now divided between Great Britain, France, Holland, Denmark, and the United States.

Cuba[1] has a somewhat elevated interior, but the only important mountain range is that which rises from the south coast in the east, the Sierra Maestra. There is a considerable extent of coast swamps, but the greater part of the coast-line is formed by coral reefs, in which the action of small rivers has formed at intervals a number of excellent nearly land-locked harbours, the only drawback to which is that where

[1] Population, by census of 1899, 1,573,000, of whom 32 per cent. were coloured (negroes, persons of mixed blood and Chinese). In 1841 this section of the population formed 58 per cent. of the total.

towns exist beside them they are apt to be silted up with pestilential mud. Under Spanish rule sanitation was wholly neglected, but matters were greatly improved in this respect during the military occupation by the United States in 1898–1902.[1] The most populous part of this island is in the west, where there are several railways supplemented by very bad roads, and where on the north coast stands **HAVANA**[2] the capital of the island, and the only large town in the whole archipelago. It is situated on a fine bay, and has an excellent natural harbour. Its chief plantation products are **sugar (305)** and **tobacco (264)**. Valuable iron mines are worked in the Sierra Maestra at Juragua and other places between the excellent port of **Santiago de Cuba** and Guantanamo, and deposits of copper said to be of enormous value exist at Cobre to the west of Santiago, though these deposits have not been worked since 1868.

Puerto Rico[3] (to give it the Spanish form of its name which has been adopted in the United States) or Porto Rico (as it has been long familiarly known in England) is the sole West Indian possession of the United States. Sugar and coffee are the two principal products of the island, but there are other tropical products, and cattle-rearing is an important industry. Great prosperity has ensued from the freeing of the island from customs duties in its trade with the United States. The capital is **San Juan**, but the chief commercial town is **Ponce** on the south coast.

British Islands. The total area of these is a little more than 12,000 square miles, and the population under 1,500,000.

(1) **Jamaica**, an island about two-thirds of the size of Yorkshire, south of eastern Cuba, capital and chief port **Kingston**; (2) **the Bahamas**; (3) **the Leeward Islands**—the Virgin Islands (part of the group), St. Christopher (St. Kitts), Nevis, Antigua, Montserrat, and Dominica; (4) **the Windward Islands**—St. Lucia, St. Vincent, Grenada (with the Grenadines); (5) **Barbados**; (6) **Trinidad and Tobago**, the former an island lying opposite the delta of the Orinoco, the latter a little to the north-east. In almost all of them **sugar** takes an important place among the exports,[4] but **cacao** and **spices** are the chief products of Grenada, and since 1885 **fresh fruits** have risen to the first place among the exports of Jamaica. Cacao is also largely grown in Trinidad, Dominica, and St. Lucia; **Montserrat** is well known for its **lime-juice**; and Antigua has a large trade in pine-apples. The **fruits** mainly exported from Jamaica are oranges, bananas, and coconuts. The principal market is the United States, but a successful trade in Jamaica fruit has also been started with the United Kingdom.

[1] It is claimed that for the first time in the history of Havana yellow fever was not epidemic in that city in 1901.

[2] Population, 240,000.

[3] Population in 1900, 953,000.

[4] During the last twenty years of the nineteenth century the total value of the exports was nearly stationary at about 6,000,000*l*.

The chief port for the fruit trade is **Port Antonio** on the north coast, which is only about 1,500 nautical miles from New York as against 4,350 miles from Liverpool. Since 1900, however, the fruit trade with the United Kingdom has been stimulated by a bounty [1] granted to a steamship company for maintaining a direct trade with Jamaica by means of ships provided with refrigerating apparatus suitable for the trade.

Among the **mineral products** of the group are **asphalt**, obtained from a large lake in the interior of Trinidad; **phosphates** from Sombrero, a small island to the east of the Virgin group; and **salt** from the Turks Islands, a dependency of Jamaica in the south-east of the Bahamas.

French Islands: **Guadeloupe** and **Martinique**, with some smaller islands, and half of St. Martin.

Dutch Islands: the three considerable islands of **Curaçao, Aruba,** and **Bonaire** (or Buen Ayre), off the north coast of Venezuela, together with two smaller islands, and **half of St. Martin**, among the British and Leeward Islands.

Danish Islands: **Santa Cruz, St. Thomas**, and one or two others of the Virgin group **St. Thomas** has a fine harbour, and having been made by the Danes a free port more than a century ago, it became the chief depôt for the West Indian Islands and the east coast of South America; but this trade has dwindled away since direct steamer routes have been established in increasing numbers between West Indian and South American seaports and those of Europe and America.

[1] The bounty amounts to 40,000*l.* a year for ten years, half of it being paid by the United Kingdom, the remainder by the colony. The British ports with which this trade is at present carried on are Bristol and Manchester.

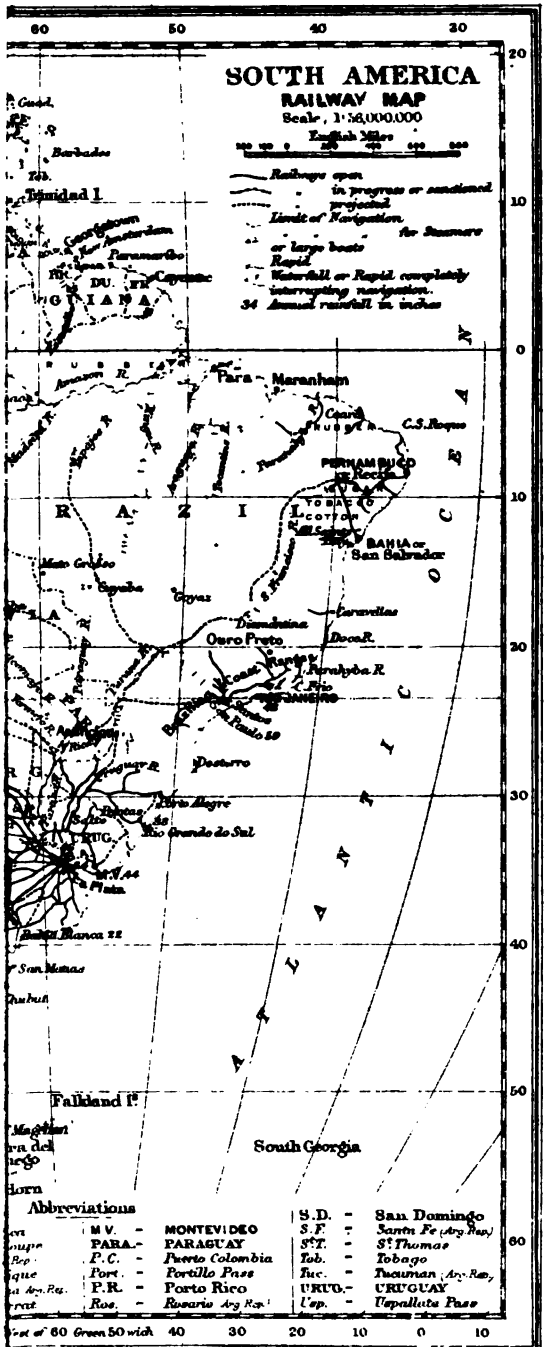
SOUTH AMERICA

919. This, the smaller half of the New World, **has at least four-fifths of its area within the tropics**, and hence yields chiefly tropical products; but here as elsewhere the temperate area, relatively to its extent, furnishes a greater abundance of commercial commodities, and it is in this part of the continent that the rate of increase in the production of such commodities, and the development of means of distribution for them, are now most rapid, and European immigration is most constant.

920. The lofty chains of the **Andes**, on the west side of the continent, form an important climatic barrier. In the latitudes in which the trade winds prevail (**35**) they arrest the moisture-laden winds from the Atlantic, draining the moisture out of winds that had already been partly drained in their course over the continent further east (**39**). The western slopes of these mountains, on the other hand, receive in these latitudes no rain from the Atlantic, and as far as 33° S. little or none from the Pacific. On that side the tendency of the wind is to blow away from the land (**35**; comp. **943**), and the rarefaction of the air on the narrow strip west of the Andes is not enough to counteract that tendency.

920*a*. The Andes also constitute a great obstacle to communication between the east and west coasts. There is as yet no railway that completely crosses any part of them, though there are railways which reach a height of upwards of 14,000 feet before attaining the tablelands between the principal chains of the mountains.

921. Some of the mighty rivers to the east of the Andes form excellent **waterways**. The **Orinoco**, in the north of the continent, is navigable for steamers continuously for nearly a thousand miles. The **Amazon** is navigable without interruption to the base of the Andes, a distance of 2,600 miles from its mouth, and 50,000 miles of navigation are afforded by the main stream and its tributaries great and small. Many of these **tributaries**, however, have their navigable course greatly **obstructed by falls and rapids**; so, for example, the **Xingu** and **Tapajos** on the right bank, the upper **Rio Negro** on the left. The **Madeira** is continuously navigable for steamers to beyond 8½° S., but there then follows a series of falls and rapids extending over a distance of two hundred miles, interrupting the communication between Bolivia and Brazil. The **Araguaya** and **Tocantins**, which enter the Rio Para



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(a southern arm of the Amazon) in one stream, both have their navigation more or less obstructed in the same way—the Tocantins to such an extent that the large boats which ascend the river from the town of Para to about 18° S. take about ten months in ascending, against two months in descending. Falls and rapids likewise beset the course of the **Rio San Francisco**, and those of all the other rivers of the mountainous part of eastern Brazil, including that of the **middle Parana**. The value of the navigation of the Amazon is diminished by the paucity of population and products in the region through which it flows and by the similarity of the products in nearly the whole of its navigable course. The sole important article of trade is rubber (**321**). **The inland waterway**, which is already of most importance, and likely to remain **most useful to commerce** in the future, is that from north to south formed by the **upper Paraguay and the lower Parana**, a waterway which is uninterrupted from near the source of the former river, and which, like the Mississippi, brings hot and temperate climates into direct communication.

922. The **population** is still very scanty, probably not more than 35,000,000. Whites of pure blood form only from two to three-tenths of the whole, negroes about one-tenth, and the remainder either native Indians or people of mixed race; so that on the whole the Indian element still largely predominates. The white population in Brazil is of Portuguese origin, and Portuguese is there the official language; but elsewhere, except in Guiana, the whites are mainly of Spanish descent, and Spanish is the official language.

922*a*. The division of languages in South America is mainly the result of the award made in 1494 by a commission appointed by Pope Alexander VI., which met at Tordesillas, near Valladolid. That commission assigned all newly discovered regions not already in the possession of Christians to Spain and Portugal, Spain to have all those to the west, Portugal all those to the east of the meridian lying 370 leagues to the west of the Cape Verde Islands. In virtue of this award Portugal claimed the coast of Brazil, when a Portuguese navigator, Cabral, touched on a portion of that coast in 1500. The remainder of South America was claimed by Spain. Nevertheless Dutch, English, and French settlements were made on the coast of Guiana early in the seventeenth century, but the English have been in continuous possession of British Guiana only since 1803, when it was taken from the Dutch during the wars of the Napoleonic period.

SOUTH AMERICAN STATES

923. BRAZIL, formerly an empire, but declared a republic after a revolution in 1889. In size it is the rival of the United States and Canada. The limited area already turned to account for agriculture

is roughly indicated on the accompanying railway map, on which the names of the chief products are likewise inserted. Even the area which travellers deem it possible to bring under cultivation at some future time is but a small fraction of the whole. The equatorial **valley of the Amazon** is filled with **dense swampy forests.** Close to the coast that trends in a south-easterly direction, stretch ranges of mountains which cut off the Atlantic moisture from the region behind (**36**). This region is made up mainly of low tablelands (**campos**) **with a sterile soil.** North of about 20° S., that is, throughout the broader part of the country south of the forests, these campos are considered fit for nothing but **pasture** (**49**). There remains nevertheless an area in the south—small, indeed, compared with the extent of the empire, but yet between four and five times the size of Great Britain—in which there are many fertile districts still unsettled, and a considerable extent of these in latitudes fit for European settlers. Till recently the practice of **slavery** deterred free immigrants from settling in those provinces in which the institution was most firmly established (those growing tropical products), but from 1871 it was in process of abolition, and it was entirely abolished in 1888. **Great efforts** are hence being made by the Brazilian government **to attract immigrants** to those districts in which a substitute for slave-labour is most needed. Immigrants, chiefly Italian and Portuguese, are now arriving in thousands. In the southernmost provinces, where slavery was never very general, **German and Italian colonies** have existed for many years. By comparing the two maps of South America it will be seen that **railways** are so far most numerous in the coffee region of Brazil (**285**, see also par. **321** and p. 593, where the chief features of the Brazilian export trade are shown). Of the projected railways shown on the railway map, one of the most important is that designed to avoid the rapids of the Madeira[1] (**921**), but for which steamers would be able to ascend to the base of the Bolivian tableland.

The capital of the empire is **RIO JANEIRO**,[2] which is also the chief seaport, and the principal outlet for the coffee region. Its harbour is admirable on account of its commodiousness and safety, and delightful on account of its beauty. The second port of this region is **Santos**, further south. **BAHIA**, or San Salvador, and **PERNAMBUCO** are the seaports of the region producing sugar, cotton, and tobacco; **Para, Maranham**,[3] and **Ceará**, those of the region yielding forest products—rubber, Brazil nuts, cabinet and dye woods, together with cacao and sugar. The ports of the temperate region yielding animal products are **Rio Grande do Sul, Pelotas**, and **Porto Alegre**, all of which are **accessible only to vessels of small draught** (under eleven feet), on account of a bar at the entrance to the shallow lagoon on which each stands.

[1] This project is now (1903) in abeyance.
[2] Population, 525,000. [3] Properly Maranhão.

924. COLONIAL GUIANA consists of three portions—one **British**, about equal to Great Britain in size; one **Dutch** (Surinam); and one **French** (Cayenne). Cultivation of plantation products (chiefly **sugar-cane**) is almost confined to the British and Dutch colonies, and in these to a strip of lowlands along the coast and the river-banks, a strip partly below sea-level, and protected by embankments. In British Guiana Demerara is the chief sugar district. The labourers are negroes, mulattoes, and coolies. On the borders of **British Guiana** a rich **goldfield** lies on the banks of the Cuyuni in the west, but long remained unworked on account of a boundary dispute. This dispute was at last settled in 1899 by an arbitration award, which divided this goldfield between the two countries. Gold is, however, found in alluvial deposits in several other parts of the forest region of British Guiana, and is produced in considerable quantity. **Cayenne** is used by the French **as a place of deportation** for convicts.

925. VENEZUELA, a republic in the north of the continent, consisting chiefly of the **basin of the Orinoco (921)**. People of Spanish, Indian, and negro descent, all now free, make up the bulk of the population; and the majority are settled on a small area of highland valleys in the north-west, where branches of the Andes strike north-eastwards, and then eastwards parallel to the coast. The staple product is **coffee**; but cacao, cotton, tobacco, and sugar, besides other tropical products, are grown. **Gold** in the east and **copper** in the west are important minerals. The plains (**llanos**) of the Orinoco are devoted to **cattle and horse rearing**, an industry at one time much more flourishing than now. The chief inland towns are **Carácas** (the capital) and **Valencia**, which are situated in inland valleys from 1,800 to 3,000 feet in height, and are connected by rail with their respective seaports, **La Guaira** and **Porto** (Puerto) **Cabello. Ciudad Bolivar**, on the Orinoco, the navigation of which is free to all nations, may also be ranked as a seaport, being accessible to sea-going vessels.

926. COLOMBIA, a republic with a similar population to that of Venezuela, settled chiefly in the upper parts of the **valleys of the Cauca and Magdalena**, where, in consequence of the high elevation, the grains of temperate climates are grown. In the lowlands, on the other hand, rice is grown; and it is so generally eaten by the people that a deficiency of this commodity has to be made up for by import. The mineral wealth is great, and **gold, silver, and precious stones** are among the exports, which include also sugar, cacao of excellent quality, coffee, bananas, and rubber. The sugar is grown at various points of the coast, cacao in the lowlands, and coffee on the mountain slopes of the Cauca valley. The great channel of communication is the **Magdalena**, which is navigable for steamers without interruption as high as Honda, but on account of a bar at its mouth is connected with the sea by a railway from Barranquilla to the port of **Sabanilla**

(the chief seaport), and higher up both by canal and rail with **Cartagena.** **BOGOTA,** the capital, is within five degrees of the equator, but, in virtue of its situation at the height of 8,000 feet above sea-level, enjoys a healthy climate, with a temperature like that of a perpetual spring.[1]

927. ECUADOR, a republic chiefly south of the equator, but which owes its name to the fact that its capital, Quito, is almost under that line. **Quito** lies, like Bogotá, between two chains of the Andes, its elevation being between 9,000 and 10,000 feet. The only seaport is **Guayaquil,** whence cacao, grown on the western lowlands, is exported. The present difficulty of communication between Guayaquil and the capital is referred to in par. 11, but a railway between the two towns is now in progress. To Ecuador belong also the **Galápagos,** or Turtle Islands, a group situated on the equator, about 700 miles to the west.

928. PERU, a republic lying to the south of Ecuador, with a population consisting largely of pure Indians. It is composed of **three zones**—(1) a rainless (**920**) **coast strip,** fertilised only here and there by rivers from the Andes, which afford the means of irrigation for sugar and cotton plantations tended by Chinese coolies. (2) **The sierra,** or valleys and tablelands of the Andes. On one of the tablelands lies (partly in Bolivia) **Lake Titicaca,** the largest lake in South America, at the height of 12,600 feet above the sea. At this height even barley seldom ripens, and the only regular food-grain is derived from a native plant called quinoa (wholly unlike our cereals). (3) **The Montaña,** the region on the eastern slopes of the Andes, containing the headwaters of the Amazon, a district largely covered with impenetrable forests, of which the most valuable product is rubber (**321**). The capital of the country is **LIMA,** an unhealthy city on the coast strip, a few miles from its port, **Callao.**

928*a*. The chief **exports** are **sugar, silver, copper,** and other metals or ores, **cotton,** and llama, vicuña, and sheep's **wool**; the sugar and cotton derived from the coast strip, the wool from the sierra. The mineral wealth for which Peru (including Bolivia or Upper Peru) was noted in Spanish times was long neglected, but in recent years renewed importance has been conferred on it by the laying of railways. Among those already in existence in Peru are two of the most remarkable in the world, those namely by which the tablelands of the Andes are reached (**920*a***). One of these is the **Lima-Oroya railway,** which attains in its passage through the western chain of the Andes a height of 15,600 feet. This railway has been continued northward to **Cerro de Pasco** (14,100 feet), and since then productive silver-mines at that place, long abandoned in consequence of flooding, have been reopened, and an even more important copper-bearing district has been developed. The other Andes railway is from the southern seaport of **Mollendo to**

[1] See also par. 914*a*.

Puno on Lake Titicaca, and this line it is now proposed to continue northwards to Cuzco, the ancient capital of Peru. The value of this line has already been greatly increased by the establishment of steamboat-traffic on Lake Titicaca and the river Desaguadero, the outlet connecting that lake with Lake Aullagas in Bolivia. Another railway project which has the prospect of being carried out is one for a line southwards from Lima, to be afterwards continued up the Andes to **Huancavelica**, where there are rich deposits of **quicksilver**. It is likewise proposed to bring the **Montaña**, now almost completely shut off from external commerce, into connection with the outside world by the laying of roads in the north to the Amazon. In this district **cotton** and **coffee** plantations have already been started with success.

929. BOLIVIA, a republic now entirely inland, occupying the broadest part of the tableland of the Andes, with a montaña to the east. Even the civilised population is mainly of Indian origin. The capital of the country is **La Paz**, on the tableland of Lake Titicaca. **Sucre** is the chief town on the part of the country drained to the east. The silver-mines of **Potosi**, discovered in 1545, which made Peru (**928*a***) so valuable a possession to the Spaniards, and in the sixteenth century had an extraordinary effect in raising silver prices in Europe, belong to this state, and are still productive, though in a greatly diminished degree. The mines of **Huanchaca**, terminus of a branch of the railway from the Chilean port of Antofagasta to Oruro, are now much more productive, and the tin-mines at high altitudes (up to 18,000 feet) east of Lake Titicaca now yield the most valuable Bolivian export. Copper, bismuth, and other metals are also worked, and the eastern forests yield much rubber.

930. CHILE, a republic, in which whites predominate, possessing the whole of the coast-strip south of Peru, together with the islands that fringe the coast, including part of Tierra del Fuego, and both sides of the Straits of Magellan except in the extreme east. The **northern portion** of the country is a continuation of the desert strip on the coast of Peru, and is valuable solely for its mineral products—**guano** (near the coast from the frontier to about 21½° S.), **nitrate of soda**, or cubic nitre, as it is also called (in the same latitudes, but further inland), gold, silver, and copper. **Copper** is even more abundant further south, along the base of the Andes, north and south of **Coquimbo**. **Silver** is also found more abundantly to the south of **Copiapo**. **The middle portion**, between about 33° and 38° S., **contains the bulk of the population** (**39*b***). The agricultural products are mainly **wheat, barley, and southern fruits**—similar, in fact, to those of Spain and California, which have a climate resembling that of the more populous parts of Chile. The temperature, however, is somewhat lower, so that oranges are not grown as a commercial product. In some parts of the north there are some **admirable irrigation works**.

930*a*. The capital is **SANTIAGO**,[1] and its port is **VALPARAISO**,

[1] Population 250,000.

on a fine bay looking to the north. Here is received the **great bulk** of the imports, but since the **greater part** of the **exports** consists of **mineral produce**, chiefly **nitrate of soda**, copper, and guano, the northern port of Iquique, whence most of the nitrate and guano is shipped, has the largest share in the export trade, Valparaiso coming only second, and Pisagua (another northern port) and Coquimbo next in order. Next to minerals **wheat** and other agricultural produce form the chief exports. The leading imports are manufactured articles, coal, and iron. The United Kingdom receives the bulk of the exports, and takes the first place in the import trade, Germany and France following, and contributing together a share about equal to that of Great Britain. There is a considerable import trade in **cattle and other animals from the Argentine Republic** across the passes of the Andes, but the export trade by these routes is very scanty. The passes chiefly used are those near the latitude of Santiago, the Portillo and the Uspallata passes, the former nearly 14,000, the latter about 12,300 feet in height.

The **Straits of Magellan** are stormy and washed by strong tides, and hence difficult of navigation, so that sailing-vessels still prefer the equally stormy, but for them less dangerous, route round **Cape Horn**, in the south of Tierra del Fuego.

931. THE ARGENTINE REPUBLIC comprises a territory of more than a million square miles. This territory consists **mainly of a vast plain** sloping down to the Atlantic from the Andes, and other lofty mountains in the west and north-west. It extends from within the tropics to the south of the continent, embracing the eastern half of Tierra del Fuego, and thus includes a great variety of climate. The districts in which the **population is most considerable and most rapidly increasing** are chiefly those in the neighbourhood of the estuary of La Plata and along the right bank of the lower Parana, where there are not only the greatest facilities for commerce, but where also the climate is most favourable to production and best suited to people of European stock. The **provinces** to which this description applies are **Buenos Aires**, south of the estuary; **Santa Fe**, on the right bank of the lower Parana; **Cordoba**, to the west of Santa Fe; and **Entre Rios**, 'between the rivers' Parana and Uruguay. The climate here is that of the warmer temperate latitudes, generally with an ample rainfall, at least in the eastern districts. These provinces contain nearly all the wheat lands of the republic (**141, 144**). Towards the interior the rainfall generally diminishes, and irrigation becomes necessary for cultivation. It is more abundant, however, in the neighbourhood of the northern mountains, at the base of which there are sugar and other tropical or sub-tropical plantations. The plain extending eastwards from these mountains to the river Paraguay is mainly a region of open forest, and is inhabited at present almost solely by a few tribes of wandering Indians. It is known as **El Gran Chaco**, or 'the great hunting-ground.'

931*a*. Of late years the Argentine Republic, together with the neighbouring state of Uruguay, has been undergoing **a rapid development** similar to that of the United States and Canada. They are receiving streams of **agricultural settlers,**[1] but mainly **from southern Europe.** Italians greatly preponderate, immigrants from Spain being next in point of numbers. A comparison of the export table on p. 612 with that on p. 592 shows how greatly tillage has gained on the rearing of live-stock. Agricultural colonies began to be planted on the banks of the Parana in 1856, but agricultural settlement now needs no special encouragement. The vine and sugar-cane are both cultivated, though they yield no export products—the vine on irrigated fields at **Mendoza** near the base of the Andes, and sugar at **Tucuman,** in about 27° S. As an illustration of the degree in which the structure of the country exposes it to cold winds from the south it may be mentioned that these cane-fields have been known to be damaged by frost which more frequently injures the grain crops. As to wool see par. **205–7,** and as to quebracho see **499.**

931*b*. To what is said about the **Paraguay** and lower Parana in par. **921,** it may here be added sea-going vessels can ascend the Parana to Rosario, that the **Parana** is likewise navigable for steamers above the confluence of the Paraguay as far as the limit of the Argentine frontier, that steamers can ascend the **Uruguay** River on the eastern frontier as far as the falls which occur in about 31½° S. (at the Uruguayan town of Salto), and that sea-going vessels of fourteen or fifteen feet draught can reach as high as the Uruguayan town of Paysandu. The **Pilcomayo,** on the northern frontier, is navigable for 240 miles, and the Rio Negro in the north of Patagonia affords 300 miles of navigation through a region deemed a few years ago scarcely fit for settlement, but which is now being rapidly stocked and settled along the whole course of the river. **Patagonia,** the territory south of the Rio Negro, is mainly a stony desert, but recent explorations have shown that it embraces a considerable amount of fertile land along the base of the Andes. On the coast of this territory there has long been a Welsh colony at **Chubut** in lat. 43°, where, among other things, wheat is grown.

931*c*. As in the United States, **railways** are being rapidly extended to promote the commerce on which the immigration depends. A mere glance at the railway map following p. 508 is enough to show that the Argentine Republic is the part of South America in which railway construction has been, and still is, most active. Unfortunately these railways are on different gauges. Nearly all those which radiate from Buenos Aires are on the gauge of 5 feet 6 inches, but some of those

[1] In the thirty years ending 1886 upwards of a million immigrants entered the country, and in each of the three years 1886 to 1888 the number considerably exceeded 100,000. In 1889 it exceeded 200,000, but in 1890 a check was put upon this immigration by the occurrence of a great financial crisis. Since 1889 down to 1903 inclusive, the only year in which the number of over-sea immigrants exceeded 100,000 was 1896, but in 1907 the number reached 209,000.

which radiate from Rosario, and nearly all starting from Santa Fe, are on the metre gauge.[1] Those in the provinces between the Parana and Uruguay are on the gauge of 4 feet 8½ inches, but this difference is of little consequence so long as the rivers named are not bridged or likely to be bridged. On the mountain track of the railway from Buenos Aires across the Uspallata Pass (**930***a*), opened on May 25, 1910, the Abt system (**93**) is adopted, and the summit of the line (10,469 feet) is reached in a tunnel nearly two miles long.

931*d*. The capital of the republic is **BUENOS AIRES**,[2] which stands on the River Plate, and is at the same time the chief seaport. So shallow is the river at this place that all large vessels formerly had to anchor ten miles out, but large harbour works have been carried out, resulting in providing the port with docks having an entrance of 21 to 26 feet deep, according to the state of the tide. These works have deprived **Ensenada**, the port of **La Plata**, lower down the estuary, of a good deal of its trade, in spite of its artificial harbour available for vessels drawing 25 feet; but the growing importance of that part of the province of Buenos Aires which forms the hinderland of **Bahia Blanca**, where there is a minimum depth of 26 feet alongside of the pier, seems to assure for that port a steady and rapid growth. For the wheat, maize, and linseed trade of Argentina it is extremely important that **Rosario**, the great collecting centre for the northern part of the region producing these commodities, is accessible to ships of large draught. Vessels drawing 16 feet have long been able to reach it, and works are now in progress with the view of making the port available for vessels of 21 feet. The more northerly collecting centre of **Santa Fe** has deep water close at hand at its port of Colastine, but a bar between it and Rosario hinders the access of sea-going vessels.

932. URUGUAY, a republic lying between the estuary of the La Plata and Brazil, has a similar surface, climate, and population, and similar industries to the neighbouring provinces of the Argentine Republic, and is now being as rapidly developed. Among the railways there is one avoiding the rapids of the Uruguay River above Salto (**931***b*), which is now connected by rail with Paysandu and the capital. Having a greater rainfall on the whole than the more populous districts of the Argentine Republic, Uruguay rears relatively to area more cattle than the latter country; and of the 1,100,000 animals that were annually slaughtered in the two republics for the making of preparations of meat, on the average of ten years 1879–88, about 60 per cent. were slaughtered in Uruguay. This industry has made the small towns of **Fray Bentos** and **Paysandu**, on the Uruguay, well known throughout

[1] In consequence of this there has arisen the necessity for duplicating the railway connection between Rosario and Buenos Aires. A metre-gauge railway between these two places is now (1903) under construction, or about to be constructed.

[2] Population, 820,000.

Europe. Among the countries sharing in the commerce of Uruguay, the United Kingdom once stood first both in imports and exports, supplying on the average of the years 1886–90 nearly 29 per cent. in value of the imports, and receiving about 17 per cent. of the exports.[1] The capital of Uruguay is **MONTEVIDEO**, which has a harbour much better by nature than that of Buenos Aires, though it is gradually becoming shallower through the accumulations of silt carried down by the streams tributary to the River Plate. Large vessels have to anchor two or three miles from the shore and load and unload by means of lighters.

933. **PARAGUAY**, an inland republic lying mainly between the Paraguay and Parana Rivers, with a very sparse population, chiefly of native Indians. Capital, **Asuncion**. Its chief export products are the so-called **Paraguay tea, or maté**, and **oranges**, orange-trees growing wild or cultivated almost everywhere in the republic. Tobacco, timber, and skins are also exported. At present the two frontier rivers are the sole channels of external commerce, but a railway already runs from Asuncion a certain distance eastwards, and then southwards.[2]

934. **THE FALKLAND ISLANDS**, situated to the east of the Straits of Magellan, belong to the **British**. They have a damp foggy climate, and are largely covered with peat, but are inhabited by a small number of settlers engaged in the rearing of sheep and cattle. They are frequently visited for repairs and supplies by vessels that have made the passage round Cape Horn. A considerable export trade in frozen mutton has sprung up.

[1] It is still first in imports, but not in exports, under which head it is surpassed by several other countries. In 1900 it supplied about 27 per cent. of the value of the imports, but received less than 7 per cent. of that of the exports.

[2] This line is now being continued southwards to the river port of Encarnacion on the Parana.

AUSTRALASIA AND POLYNESIA

935. AUSTRALIA. The vast island or continent of Australia has an **area** of nearly three millions of square miles, and is accordingly almost exactly **equal in extent to the United States of North America,** exclusive of the territory of Alaska. A good deal more than one-third of it lies within the torrid zone, but the great bulk of its population belongs to the region outside of that belt. Most of the inhabitants, moreover, are found within two or three hundred miles of the coast, and from the nature of the climate this can never be otherwise.

936. The **coast-line** of this vast island is remarkable for its long stretches of uniform character, without inlets that can be made use of by shipping even for shelter. The principal exceptions to this character are on the eastern side and in some parts of the north-west.

937. To the north of Hervey Bay, on the east coast, numerous **coral-reefs** rise to the surface of the water, making the seas somewhat dangerous to shipping, and about one degree north of the Tropic of Capricorn there begins a series of coral-reefs such as are to be seen nowhere else in the world over the same extent of sea. These form together what is known as the **Great Barrier Reef,** which extends for a distance of about 1,200 miles, advancing into the latitude of Torres Strait, which it nearly closes. Its widest part is in the south, where it extends for about 100 miles from east to west, and in that part also it lies furthest from the coast. As it narrows towards the north it comes nearer to the coast, being in many places within ten miles of the land, opposite the promontories, and generally not more than fifteen or twenty miles distant. At low tide the surface of the reef is just about the level of the surface of the water, and at all states of the tide the border of the reef can be distinguished by the strong breakers that wash over it. The reef however is not continuous. It is broken up by many deep channels, some of which are narrow, others from ten to twelve miles wide. To seamen these channels are of great importance, since they allow of a choice of routes between the seaports in the east of Australia and Torres Strait. The route within the Barrier Reef along the Australian coast has the advantage of a calm and beautiful sea owing to the protection which the reef affords, and is that preferred

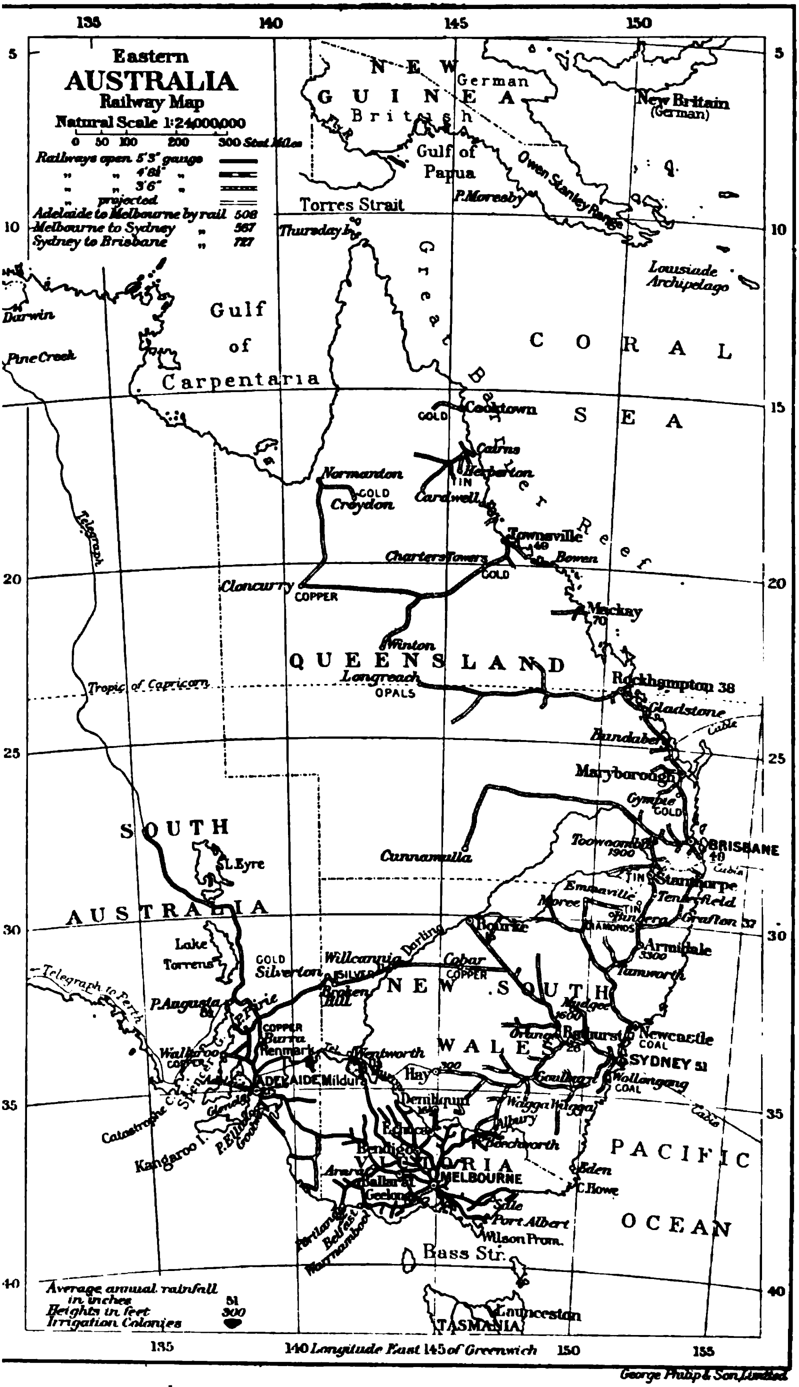
by steamers, whose course can be more easily controlled than that of sailing-vessels. But this route is one that requires careful navigation, and above all at night, when the reef cannot be made out at a greater distance than half a mile. By day it is visible at a distance of four miles from the bridge and seven miles from the rigging. Hence, sailing-vessels that take the inner route proceed on their course only by day, anchoring for safety at night. For the most part such vessels go outside of the reef altogether into the open ocean, and pass through one of its northern channels into or out of Torres Strait.

938. Even to the west of the Barrier Reef the **navigation of Torres Strait** has been made difficult by the coral builders. The hundred miles of sea between Cape York and the south coast of New Guinea, besides being studded with numerous small islands, are crowded with coral reefs and sandbanks, which leave only one or two safe channels for shipping between them. The channel most used is that which lies immediately north of the **Prince of Wales Group** of islands, on one of which, named **Thursday Island**, there is a much-frequented calling-station for shipping.

939. Off the southern part of the east coast of Australia, there is at all seasons a **strong current setting southwards.** It forms a broad belt at the distance of from twenty to sixty miles from the land, on which account vessels going northwards (from Bass Strait to Sydney) keep more than sixty miles from shore to avoid the current, and those going southwards keep within the current to take advantage of it.

940. The **surface** of Australia is for the most part fairly level, consisting either of plains or plateaux of great extent. In the east, however, a continuous range of highlands runs at no great distance from the coast from north to south, and then bends with the coast westwards, terminating in the south-east of the colony of South Australia. The general name of **Dividing Range** is given to the whole of this series, since it separates the low-lying coast valleys and small plains from the broad plains of the interior. In the south-east, where the Dividing Range attains its highest elevation (with peaks above 7,000 feet in height), it forms a regular mountain chain known by the name of the **Australian Alps.**

941. The Dividing Range has been the chief obstacle in the establishment of **railway communication** with the interior—an obstacle which has been overcome in some places, especially in New South Wales (957), only by great engineering skill. The map on p. 520 shows that there is no railway connection with the interior between Melbourne and Sydney, and a careful study of physical maps shows that this is a natural consequence of the superficial configuration, which is thus disadvantageous for both the states to which these ports belong, but at the same time favourable to the ports themselves, as concentrating upon each a greater amount of traffic than would otherwise have fallen to them.



Longmans, Green & Co., London, New York, Bombay & Calcutta.

942. The plateau in the east of Australia attains at its widest a breadth of rather more than one hundred miles, and gradually sinks on the west to low level plains, which occupy the greater part of the middle of Australia. The western half of the island, so far as it has been explored, consists mainly of a low plateau about 1,000 feet in height or less.

943. The series of highlands above described is appropriately called the Dividing Range, not only on account of the contrast presented by the surface on different sides of it, but also because of the influence which it has upon the **climate**. The chief rain-bearing winds of Australia blow more or less from the east, since the island lies mostly in latitudes in which the south-east trade-wind prevails, and the causes which give rise to that wind have a great effect on the direction of the air-currents even on the land. Hence, **in the western half of the island the prevailing tendency of the winds is seawards**, and the period of the year in which this tendency is mostly overpowered is the summer, when the excessive heat of the interior brings about great rarefaction of the air, but at the same time tends to prevent any vapour that may be brought from the sea from being condensed into rain. As to the climate of the extreme south-west see par. **39*b***. The highlands on the east, however, have their usual effect on sea-borne vapours, and their **eastern slopes are copiously watered at all seasons of the year**, but in the tropical and sub-tropical latitudes chiefly in summer (**39**). The interior plains and plateaux, on the other hand, receive less and less rain the farther they are distant from the sea, and almost all parts which are more than two hundred miles from the coast receive much less rain in the course of the year than the driest parts of England (**486**). This rain, too, falls in latitudes in which the heat and consequent evaporation are greater than in the British Isles, so that in summer the ground is everywhere parched and cracked, and the grass withered, and none but winter crops can be grown, even where the rainfall is sufficient to grow crops at all. Even where the average rainfall is adequate for the crops usually grown and for the wants of the live-stock reared it is in many parts very precarious, years of flood alternating with years of drought, leading to great variations in the yield of the crops (**141**) and the number of sheep and cattle that can be reared in a given area.

Between the northern part of Australia which lies within the tropics, and the southern part, from 10 to 15 degrees beyond the tropics, there are of course great differences in the **temperature**; but in all parts of Australia there is in the low grounds no winter of snow and frost to interrupt the labours of the field, or to make it necessary to provide shelter for horses and cattle.

944. The nature of the climate of Australia explains that of the Australian **rivers**. Most of those which enter the sea on the east and south-east of the Dividing Range are comparatively short, but

are generally well supplied with water all the year round. They vary greatly in their depth according as the weather is dry or rainy, and they are in many cases apt to overflow their banks. Many of them are navigable for a shorter or longer distance up; but they bring down so much sediment from the neighbouring highlands in which they take their rise, or from which they derive their feeders, that bars are formed in many cases at their mouths, and the entrance of large vessels thus prevented or impeded.

945. All the great rivers of Australia take their rise on the inner slopes of the tableland, and flow towards the west or south-west. Only one of these, the **Murray**, enters the sea by an independent mouth. Before entering the sea this river turns nearly due south and flows through a large shallow sheet of water called **Lake Alexandrina**, which communicates on the south with **Lake Albert**, and a long shallow lagoon known as the **Coorong**, separated from the sea by a broad line of sand-dunes. The longest tributaries of the Murray are those which it receives on its right bank, the **Murrumbidgee** and the **Darling**, the former of which receives on the right another great tributary, the **Lachlan**. These rivers might all be ranked among the great rivers of the world if we considered only their length (the Murray and the Darling being both much more than 1,000 miles long), but the climate of the region through which they flow causes them to be very scantily supplied with water. The Darling even dries up in summer in many parts of its course into a chain of small lakes.

946. Nevertheless **all these rivers are navigable by steamers of shallow** draught for a long distance into the interior. In ordinary circumstances the Murray can be ascended as high as Albury, 1,700 miles from its mouth, the point where the river is crossed by the railway from Melbourne to Sydney. Except in dry seasons the Murrumbidgee can be navigated up to a point about a degree farther east than Albury, and the Darling is navigable at times up to the confluence of the Bogan, 1,000 miles above the point where it joins the Murray. Unfortunately, however, this river navigation cannot be continued into the sea. The line of sand-dunes which separates the Coorong from the sea is continued in the form of a **bar across the mouth of the Murray**, where it leaves Lake Alexandrina, so that goods must be laid down or taken up at some point in the course of the river and carried the rest of the distance by land.

947. Of the other long rivers which are to be seen on maps traversing the plains in the interior of Australia, the greater number are hardly rivers at all in the proper sense of the term. They are merely watercourses which may be filled at times with running water, but which are often empty except for a few days in the year. Many of them after a longer or shorter course dry up and disappear, their water having all sunk down into the porous sand which forms their bed, or evaporated under the heat of the sun. The most important of

the streams that end in this way is the **Diamantina**, which enters South Australia from the south-west of Queensland. Others empty themselves into large shallow salt lakes, which in summer shrink greatly in dimensions. There are several such **salt lakes** in the lower parts of Australia, the chief being **Lake Torrens** and **Lake Eyre**, into the latter of which flows at certain seasons the **Barcoo River**, or **Cooper's Creek**, the longest of these feeders of island lakes. In the dry period of the year this river in its lower part creeps on more and more slowly, and in the end dries up like the Diamantina, though the course which it follows in times of flood, when it swells to a breadth of two miles and rises to a depth of twenty feet, can still be distinguished by the grass and trees by which it is bordered.

948. The use of the great rivers of the Australian plains as navigable highways and for the watering of flocks is the most important to which they have yet been put, but a much more valuable use is likely to be found for them in the future. **The gradual slope of the plains** over which these rivers flow **seems likely to admit of many large tracts being irrigated** by their means.

949. Vegetation.—On the tableland and plains of the interior an Australian forest is open and easily traversed either by a horseman or by carriages, and leaves plenty of space for grass and herbage on which sheep may be pastured. Such is the general character of the Australian bush. The forests become thinner and thinner the scantier the rainfall. In many of the more arid parts large stretches of ground are occupied by dense masses of low bushes difficult to penetrate and difficult to destroy, these patches being well known as '**scrub**'; and in more arid regions still the bushes forming the scrub are often armed with strong sharp spines, which tear the clothes and the flesh of those who try to force their way through. The hated spinifex is a shrub of this kind, which covers by itself vast areas in the deserts of the west and centre of Australia.

The native **grasses** of Australia are numerous and nutritious, and among these the tall **kangaroo grass** is notable for its power of withstanding long drought. And even where the climate is so dry that grasses do not thrive, there are certain herbs which will still thrive and yield good food for sheep and cattle. The most valuable of all these is the **salt-bush**, an ugly grey shrub about two feet high, which, as its name indicates, flourishes on a saline soil, such as is apt to be found where rain is scarce and evaporation great (53), but which is all the better for sheep on that account, since the sheep that are fed on a saline herbage are reported to furnish the finest wool, and are free from certain diseases to which they are liable in other districts.

950. People.—The **native Australians** belong to a very low type of humanity, are few in numbers, and appear to be fast dying out. The first inhabitants sent from the British Isles to Australia were convicts, and the first ship containing convicts sailed in 1787, and arrived

at Botany Bay, in New South Wales, early in 1788. Soon **free settlers** began to arrive. These were mainly **from the British Isles**, but there is also a large proportion of **Germans**. **Chinese** (these nearly all men) and **Polynesians** have been introduced into Queensland as labourers on the tropical plantations (958); but under the legislation of the Commonwealth not only is the introduction of all coloured labour prohibited,[1] but even that of white labourers under contract, unless it can be shown that the labour which these supply is of a kind that cannot be obtained in the Commonwealth.

951. THE AUSTRALIAN STATES AND NEW ZEALAND.—Area, Population, and Products:—

Colonies	Area in thousands of square miles	Ratio to Great Britain	Population in thousands		Increase per cent. on 1871	Number per 100 persons living in 1900–01		
			1871	1901		Sheep	Cattle	Acres under crop
Victoria . .	88	1	782	1,208	65	897	133	325
New South Wales	310	$3\frac{1}{2}$	504	1,360	170	2,918	145	172
Queensland . .	668	$7\frac{1}{2}$	120	503	319	2,054	310	91
South Australia .	903	10	186	366	97	1,432	59	645
Western Australia	976	11	25	195	678	1,250	174	104
Tasmania . .	26	$\frac{1}{4}$	102	173	69	976	96	130
Commonwealth	3,071	33	1,669	3,805	...	...	...	...
New Zealand .	104	$1\frac{1}{6}$	256	816	219	2,373	148	182

951*a*. The Australian Commonwealth was constituted under an act of the Imperial Parliament passed in 1900, and was proclaimed at Sydney on January 1, 1901. The colonies above mentioned, except the colony of New Zealand, now form the six original states of this Commonwealth, which among other powers has the right to pass laws regulating trade and commerce with other countries and among the states, but subject to the provisos that uniform customs-duties shall be imposed, and that trade shall be free within the Commonwealth; laws regulating taxation, but so as not to discriminate between states, or parts of states; laws as to naval and military defence, including the control of railways for such purposes, railway construction and extension, &c. The legislative authority is vested in a parliament of two houses, namely, the Senate, composed of six representatives of each state directly elected by the people of each state voting as one electorate (except Queensland), and the House of Representatives, composed of members also directly chosen by the people in proportion to the number of the inhabitants, but so that the total is as nearly as possible double the total number of senators. As now constituted it comprises 75 members, of which New South Wales returns 26, Victoria 23, Queensland 9, South Australia 7, Western Australia and Tasmania each 5.

[1] Under the Pacific Island Labourers' Act no Pacific Islanders are allowed to enter Australia after March 31, 1904, or are to be allowed to remain there after the end of 1906.

The Sovereign is empowered to appoint a Governor-General for the Commonwealth. The seat of the general government is to be in New South Wales, but not within 100 miles of Sydney.[1] Subject to this general constitution, the constitution of each state in the Commonwealth is to remain until legally modified the same as at present. A somewhat protective tariff has been adopted by the Commonwealth.

952. With the exception of the minerals the **commercial products** of Australia are mainly **derived from animals and plants introduced** by the European settlers. The native land mammals, nearly all of which belong to the same peculiar group as the **kangaroo** (marsupials), yield furs of comparatively small value in the aggregate, and from a commercial point of view destroy a great deal more than they produce. The same is true of the dingo, or native dog, the only large native mammal that is not a marsupial. The most valuable of the introduced animals is the sheep, **wool** holding at the lowest the second place in value among the objects of production in all the colonies. The wool production of the Australian colonies in general is treated of elsewhere (**205**–**7*a***), but here it may be added that no part of the world has shown itself better suited for the production of fine (merino) wool (**202**) than the treeless grassy plains with a saline soil bordering the Murray River and its tributaries in Victoria and New South Wales. Sheep in Australia are usually reared on large tracts of land, known as **sheep-runs**, which are leased from the government. The name of **squatter**, originally applied to one who settled on land to which he could show no other claim than that it was claimed by no one else, has come to be the recognised term for such government leaseholders in all the states. As to **rabbits** see **83*b***.

952*a*. In the two states of the mainland in which, as shown in the last column of the table in par. **951**, there was the **greatest extent of land under cultivation** relatively to population, **wheat** is the chief crop. South Australia (**141**) at one time supplied wheat and flour to all the other states, but of late wheat cultivation has extended so much in Victoria that that state is now independent, and can even export some wheat itself. It is in these two states also that the **vine** receives most attention (**186**), but in this case Victoria takes the lead. **Sugar-cane** is cultivated in Queensland, and a variety has been found to succeed far beyond the tropics, and is grown even in the north-eastern valleys of New South Wales. With regard to the **olive** see **326*b***, and as to **southern fruits** see **956**.

953. The **mineral wealth** of the states already commercially available is enormous. Hitherto by far the most important of the mineral treasures has been **gold**. It has been found more or less in all of them, but most abundantly in the three eastern states of

[1] It has not yet been fixed. Tumut, in a rich agricultural district 100 miles west-south-west of Goulburn, was selected by the House of Representatives, but the selection was not agreed to by the Senate.

Australia and in New Zealand. Victoria stands first in respect of the amount of gold produced, having raised gold since its first discovery in the colony, in 1851, to the value of upwards of 250,000,000*l.*, or about six times as much as any other state. But with regard to this metal it is important to bear in mind that, on account of its great value, it is so eagerly searched for in districts known to be rich in it, that the amount yielded by any district soon begins to diminish. Hence the prosperity which a gold-field brings to a district is often only a passing prosperity. While the aggregate value of Australian wool increased pretty steadily till after 1890, that of gold soon reached its highest value and began to decline. The period from 1856–60—that is, the first period of five years after that in the beginning of which the first great discovery of gold was made—was the period in which the value of gold produced in all the Australian states reached its highest; and in every succeeding period of five years the total value has been less than in the one immediately before. (See **410, 411.**)

The other minerals of commercial importance include **copper** in South Australia and New South Wales; **tin** in all the eastern colonies and Tasmania; **silver** in New South Wales; **coal** in New South Wales, Queensland, Victoria, Tasmania, and New Zealand; and **oil-shale** in New South Wales. **Ores of iron** are present in large quantity in almost all the states, but as yet are scarcely worked.[1]

954. Commerce.—On p. 614 will be found general statistics of the external trade of the Commonwealth, and these may be allowed in a large measure to speak for themselves. The high importance of the Australasian commerce as a whole to the mother country is explained in par. **495**, and this fact gives special interest to the relative decline in that commerce shown in the last table on p. 614, for though, for the reason stated at the top of that page, these figures cannot claim to be exact, they must be sufficiently near the truth to indicate the direction and something of the degree of the changes in progress. The marked advance in the trade of Australia with foreign countries as compared with a stationary or declining proportion of the trade carried on with the United Kingdom since the period 1881–85 is not to be wondered at, when it is considered that it is mainly since the beginning of that period that direct trade has been opened up with foreign countries. Direct trade with Germany began in 1879, with Belgium in 1881, with France in 1883. Since 1887 the North German Lloyds has run regular steamers to Australia; since 1888 a line of German cargo-boats has connected the chief Australian wool-ports with Antwerp, Hamburg, and Dunkirk.

955. All the states, and even the ports of the Kimberley district

[1] Under the encouragement of bounties great iron and steel works are now being started in New South Wales.

in the north of Western Australia, are now in regular **steam communication with Europe.** Different routes are followed, but most of the ships pass through the Suez canal and along the south coast of Australia. Since 1872 the Australian states have been connected by **electric telegraph** with the rest of the world, through the completion of the overland line which crosses the state of South Australia between Adelaide and Port Darwin, and is there connected with a line which passes under the sea to the Dutch island of Java. The cable from Vancouver to Queensland and New Zealand by Fanning, Fiji, and Norfolk islands was completed in November 1902.

956. THE SEPARATE STATES.—A.—Victoria is the smallest of the states on the mainland of Australia. It occupies the extreme south-east, and is separated from the state of New South Wales mainly by the Murray River. The first permanent settlement on its territory was made towards the close of 1834. Till 1851 it was a dependency of New South Wales. A large part of the surface is mountainous. The **Australian Alps**, with their spurs, fill the greater part of the eastern half of the state. West of these mountains the Dividing Range sinks in elevation, so that easy routes could be found for the railways laid north of Melbourne to the plains on the other side. The plains to the south of the Dividing Range, lying as they do on the moister side of the mountains (**943**), are well watered, in many places thickly covered with trees, and clothed with rich grasses, more suited for horses and cattle than for sheep. This is especially the character of **Gippsland**, the region to the south of the Australian Alps. In the north there is greater dearth of rain; nevertheless, it is in this part of the state that the area under crops has been most rapidly increasing of late years, since the decline of the gold-fields has caused so many people formerly engaged in mining to take to farming (**953**). In some years the rainfall even here is sufficient to allow of abundant crops being grown, but when the rains fail great loss follows to the cultivators. Hence, if farming is to be carried on regularly with success in this region, it can only be by **irrigation.** In the north-west is the district called **Wimmera**, at present mainly a waterless desert, but containing a tract with an excellent soil bordering the Murray, on which large irrigation works have been carried out at **Mildura**, and are now managed by a government trust. (See the map, p. **520**.) The area embraced by these works is a quarter of a million acres. Among the objects of cultivation are grapes, including the raisin and currant grapes; oranges, figs, apricots, and peaches; plums, including plums for prunes; besides sorghums (**299**), tobacco, fibre-plants, and other crops. Further south the plains are now being reclaimed for wheat cultivation by clearing them of what is known as the mallee scrub, that is, thickets of the *Eucalyptus dumosa*, brittle-stemmed trees growing to the height of from 12 to 20 feet; but the yield of the crops, like the rainfall, is scanty and very precarious.

Sugar-beet is becoming an important object of cultivation round **Maffra** in Gippsland. **Coal** is being mined in rapidly increasing quantity on the east side of Western Port.

956*a*. The capital and chief seaport is **MELBOURNE**,[1] situated on the Yarra, a short distance above its mouth in Port Phillip Bay. The Yarra is navigable up to the city by vessels of considerable size, including all those engaged solely in the intercolonial trade; but the harbour of Melbourne for the largest ocean steamers is formed by Hobson's Bay, the upper part of Port Phillip. On this bay stand Port Melbourne (formerly Sandridge) and Williamstown. Port Phillip itself is a shallow sheet of water, which affords a large extent of safe anchorage, but has a very narrow and difficult entrance. On a western arm of this bay stands the port of **Geelong**, a town that has long carried on the manufacture of coarse woollen tweeds, &c., which are exported to all the Australian states. In the interior, north-west of Melbourne, is **Ballarat**, the centre of the richest alluvial gold-field ever opened up, but which is now to a large extent exhausted, gold being now mainly obtained not by digging, but by the crushing of quartz-rock. In a more northerly direction from Melbourne lies **Bendigo** (Sandhurst), the chief centre of quartz-crushing; on the Murray, **Wodonga**, opposite the New South Wales town of **Albury**, at the head of the ordinary navigation, where the river is crossed by the railway to Sydney; lower down **Echuca**, at the place where the river makes a sharp bend to the north-west, and where another railway now crosses into New South Wales. (See map, pp. 54–5.)

957. B.—New South Wales, so called by Captain Cook, who was reminded of the Wales of Great Britain by the appearance of the mountains which he saw from off the coast. It was in this state that the first settlement was founded in Australia (950), namely, on the magnificent natural harbour of **Port Jackson**, the harbour of Sydney, which has few rivals in the world for either beauty or convenience. Throughout this state the Dividing Range forms a more continuous barrier between the coast lowlands and the interior plains and tablelands than it does in Victoria, and it was long before the settlers found a way across the **Blue Mountains**, as the part of the Dividing Range behind Sydney is called. The route at last found in this quarter is now traversed by a railway, which runs for sixty miles through the mountains in numerous zigzags, and finally pierces them in a tunnel 3,700 feet above sea-level. Farther north the **New England Range**, trending north and south, and the **Liverpool Range**, trending east and west, shut off the part of the tableland known as the **Liverpool Plains**, which contain the head-waters of the Namoi, or Peel River, one of the tributaries of the Darling. The interior of New South Wales generally is traversed by the chief tributaries of the Murray,

[1] Population, including suburbs within a radius of ten miles, about 500,000.

and the treeless plains noted for their wool (952) lying to the north of that river are hence known as the **Riverina.** The **population** of New South Wales of late years has increased at a much more rapid rate than has that of Victoria, which it now exceeds. It is, however, much more widely distributed over the surface, so that there is no part of New South Wales where the railways are so thickly crowded together as they are in part of Victoria. The reason of this is that the mineral treasures of the state are more widely distributed than in the sister state; and the population engaged in agriculture is similarly scattered, partly because it is the interest of corn-growers to be near those who will buy their corn, and partly because the lands best suited for agriculture in New South Wales are dotted at wide intervals over the state. Most of the coast-strip is rather sterile, except here and there in the valley-bottoms. On the tableland within the Dividing Range there is a greater extent of good soil, but the rainfall ceases to be sufficient for agriculture within a distance of 150 or 200 miles from the coast.

Lord Howe's Islands and **Norfolk Island,** lying to the north-east of Sydney (the latter nearer the north-west point of New Zealand), are dependencies of New South Wales. They both contain a small number of inhabitants.

957*a*. The capital of the state and chief seaport is **SYDNEY,**[1] on Port Jackson. At the head of the so-called Parramatta River, which is in reality a prolongation of the inlet of Port Jackson, stands **Parramatta,** in a district noted for its oranges. North of Sydney, on the estuary of the Hunter River, stands **Newcastle,** the chief coal-mining town and place of export of **coal** (954). The coal is now exported not only to all the other Australasian states, but also to India, China, South America, and even San Francisco. Another important coal-port is **Wollongong,** to the south of Sydney, the port of the Illawarra coal-field. **Bathurst,** on the tableland behind Sydney, is the centre of the chief **wheat**-growing district of the state; **Deniliquin,** that of the pastures of the Riverina (957), and the starting-place of the railway by which the **wool** of that district is despatched for export to Melbourne; **Broken Hill** and **Silverton,** near the western frontier, the chief towns of the Barrier Range, a **silver**-yielding area said to be 10,000 square miles in extent; **Cobar,** in the heart of the state, the chief **copper**-mining, and **Vegetable Creek,** near the northern frontier, the chief tin-mining, town. The water-supply of the silver-mining district was at first a difficulty, but is now obtained from local rivers. Most of the ore is conveyed to Port Pirie in South Australia, and there smelted.

958. C.—Queensland, the state to the north of New South Wales, once, like Victoria, a dependency of New South Wales, from which it was separated in 1859. It includes all the islands in the narrowest part of Torres Strait (938). The surface consists mainly of tableland

[1] Population, within a radius of ten miles, 520,000.

above 1,000 feet in height, and the district in the south-east known as the **Darling Downs**, on which are the finest pasture grasses in the state, is about 2,000 feet high, and thus has a comparatively cool climate for its situation, within five degrees of the Tropic of Capricorn. Extending far into the torrid zone, Queensland has more varied products than the more southern states. Among the tropical and subtropical products are cotton, arrowroot, ginger, coffee, fruits, but at present chiefly **sugar-cane**, which is largely grown in the low river-valleys on the coast (see 950). **Gold** is found at many places, but most abundantly round **Charters Towers**, near the Burdekin River, about the middle latitude of the state, and round **Gympie**, in the Wide Bay district, not far from the coast in the south-east. **Tin** is found in two widely separate districts. One of these is on the tableland in the extreme south of the state, in a district adjoining the New South Wales tin-field, the centre of this district being **Stanthorpe**. The other, which is the more productive of the two, is round **Herberton** near the east coast, in about 17½° S. lat. A very rich **copper** district lies round **Cloncurry**, in the west of the state, to the south of the Gulf of Carpentaria, and in January 1908 this was connected by rail with Townsville. Besides metals, Queensland is very rich in **coal**, but it has not, like New South Wales, a coalfield accessible to ocean-going vessels. The chief collieries are in the basin of the Brisbane and Bremer rivers, and next in importance are those from 15 to 20 miles north of Maryborough in about 25° S.

958*a*. The capital of the state is **BRISBANE**, 500 miles north of Sydney, situated on both sides of the Brisbane river, at the head of navigation for large sea-going vessels. **Toowoomba**, on the tableland to the west of Brisbane, is the chief town on the Darling Downs. **Rockhampton**, close to the Tropic of Capricorn, at the head of navigation on the Fitzroy River, is the second town in population in the colony, the outlet for a rich and extensive pastoral district as well as for districts producing gold and copper. **Townsville** is the outlet for several large gold-fields, including that of Charters Towers, and also for a large area of pastoral country, so that it has become an important seaport though it has only an open anchorage. Brisbane, Rockhampton, and Townsville are the starting-points of **three lines of railway** which are being laid for a distance of from 300 to 500 miles into the better parts of the tableland. The fine harbour of Bowen, naturally the best on the coast, still lacks for its development direct railway communication with the interior.

959. D.—South Australia does not answer to its name, but extends from south far to the north west of the three states already treated of. It was founded in 1834 by an act of the British Parliament, and, at the time of its foundation, was expected ultimately to include the territory belonging to Victoria. **Most of the inhabitants** of the state are **confined to a district smaller than England**, which is

the only part in temperate latitudes that receives even a fair supply of rain, chiefly in winter (39*b*). This district lies mainly to the east and north of **Spencer Gulf** and the Gulf of **St. Vincent**, where it is traversed by the **Mount Lofty Range** and the **Flinders Range** of mountains. Among agricultural products **wheat** is the most important. Wine and olives are also included. From an early date **copper** has been its chief mineral, but a goldfield, said to be rich, has been discovered about 200 miles north-east of Adelaide.

Irrigation is practised in the drier parts of the state. At **Renmark** (see the map on p. 520) similar irrigation works to those of Mildura in Victoria have been carried out. Irrigation by **artesian wells** (62) is found to be practicable at several places in the neighbourhood of Lake Eyre, which is the lowest-lying part of Australia. Further north the telegraph line passes through many well-grassed regions which may some day be settled, and other grassy tracts are now known to border some of the river courses of this region. The most important of these rivers is the **Finke**, which flows south-eastwards from the **Macdonnell Ranges** (on the Tropic of Capricorn), but dries up before reaching Lake Eyre.

The **northern territory** of Australia, formerly a part of South Australia, was placed under the direct government of the Commonwealth in 1910. Chief town **Palmerston**, on Port Darwin (955).

959*a*. The capital of the state is **ADELAIDE**, situated near the **east** side of the Gulf of St. Vincent. It was founded in 1837, and named after the queen-consort of William IV. About seven miles from the city stands **Port Adelaide**, on a small inlet opening out of the Gulf of St. Vincent. An outer harbour with a depth of 30 feet, opened at this port in January 1908, first provided accommodation for large ocean steamers. Since the completion, in 1887, of the series of railways from Adelaide to Melbourne and Sydney, the port of Adelaide has been 'the Brindisi of Australia'—the place at which all the mails are collected and landed by vessels following the south coast route. **Burra Burra**, about one hundred miles north of Adelaide, is the seat of the chief inland copper-mines, but the principal copper-mines in the colony are those of **Moonta**, on the peninsula between Spencer and St. Vincent gulfs. From a neighbouring port some of the ore is shipped for smelting to Newcastle in New South Wales, in vessels which bring back coal to carry on smelting at the South Australian port. (Comp. 517.) **Port Augusta** is a wheat-port at the head, **Port Pirie** (957*a*) another on the east side, of Spencer Gulf, and **Port Lincoln**, a third, near the south end of Eyre's Peninsula.

960. E.—Western Australia, the largest but the least populous of all the states. The vast deserts belonging to it will always cause it to be more imposing in extent than population, and even in the principal settled area, the district in the south-west, which receives autumn and winter rains brought by north-west winds, corresponding to the

south-west winds of western Europe (35*a*), the population is very sparse. This is largely owing to the character of the country. Though there is much good soil, the fertile districts are scattered, and the best land for European settlers is far from what was, till the construction of the excellent harbour of Fremantle, the only good harbour of the settled district, that of **King George's Sound**. Fine hard **timber (350)** has always been an important product of this state. But the population of this part of Australia did not begin to develop until the discovery of important goldfields in the south. The most productive are the adjoining fields of **Coolgardie** and **Kalgoorlie** in about 31° S., but so far in the interior that the industry was long greatly hindered by the lack of water. A plentiful supply is now, however, (since January 1903,) pumped from a vast reservoir about 25 miles from Perth at a distance of 325 miles from Coolgardie and 350 from Kalgoorlie. Before the discovery of the Coolgardie goldfield in 1891 the population of Western Australia did not exceed 50,000. The Murchison goldfield, of which the chief centre is **Cue**, lies in about 27½° S. In the south-west of the state on the Collie River are important deposits of coal, which is exported from **Bunbury**, a place of export also for the hard timber of the state. In the **northern parts** of Western Australia **pearl-fisheries** are carried on along the coast, but this industry is threatened by the legislation of the Australian Commonwealth against the employment of coloured labour. The capitalists engaged in the industry contemplate, it is said, carrying it on so far as possible from Dutch New Guinea. **Gold** also exists in the interior of this part of Western Australia, and good pasture-lands have attracted settlers. The chief pastures are in **Kimberley District**, along the banks of the **Fitzroy River**, which flows into **King Sound**, about 17½° S. The capital of the state is **Perth**, on the Swan River, about twelve miles above its port, **Fremantle**, on the west coast. **Albany**, on King George's Sound, 260 miles distant from Perth, is the place where the first settlement was made on West Australian territory (in 1826).

961. F.—Tasmania.—This state consists of the island so called, together with the smaller islands adjacent. It is separated from Victoria by Bass Strait. Like Victoria and Queensland, the state was originally a dependency of New South Wales, and the first settlement upon it was a convict establishment formed in 1803, but it was made independent in 1825. The surface of the main island is in great part high. **A bleak tableland**, from 2,000 to 3,000 feet in height, occupies the middle and a large part of the western half of the island, and is crowned by mountains, and cleft by deep chasms through which issue the torrents which come to form the rivers of the west coast. **To the east** of this tableland lies a **tolerably level and open district**, which forms the great grazing-ground of the state. Elsewhere the colonists have had to contend with land more or less heavily timbered. The climate is somewhat warmer than that of England, very suitable for

all English crops, and specially well adapted for **fruits**. **Copper** (at Mount Lyell in the west near Macquarie Harbour), **tin** (at Mount Bischoff in the north-west and elsewhere), and **gold** are important minerals, and coal-mines and oil-shale (the latter near Latrobe in the north) are also worked. The capital is **Hobart**, at the end of the island farthest from Australia, an inconvenience which is, however, outweighed by the excellence of its harbour, formed by the estuary of the Derwent. **Launceston** is at the head of navigation on the Tamar, forty miles from the mouth of the estuary known as **Port Dalrymple**, on the side nearest to Australia.

962. NEW ZEALAND.—This colony (first settled in 1840, and styled by proclamation in September 1907 a Dominion) consists mainly of two large islands and one smaller one, situated at the distance of about 1,000 miles from the nearest points of the south-east coast of Australia. The large islands are usually known as the **North and the South Island** (frequently called the Middle Island), and are separated from each other by **Cook Strait**. The smaller island is called **Stewart Island**, and is separated from the South Island by **Foveaux Strait**.

Besides the main islands just mentioned New Zealand possesses several groups of small islands at the distance of from 150 to 850 miles. The principal are the **Chatham Islands** to the east, the **Auckland Islands** to the south, and the fertile group of the **Kermadec Islands** to the north-east.

The **coast line** of New Zealand is in most places high and rocky, especially on the west coast. In the extreme south-west it is broken up by numerous inlets with very steep and lofty cliffy shores, resembling the **fiords** of Norway.

962*a*. The **surface** of all the islands is **highly mountainous**. One long succession of mountains runs through both islands from the south-west to the north-east. In the South Island these mountains lie for the most part close by the west coast, and it is about the middle of this island that the highest parts of the whole series are found. These parts are called the **Southern Alps**, and, like the Alps of Europe, they are crowned by perpetual snow, and have their higher valleys filled with large glaciers, their lower valleys occupied by large and picturesque lakes. So difficult are these mountains to cross, that for more than a hundred miles there is no road connecting the east and west coasts of the South Island. The West Coast Road between Christchurch and Hokitika passes through a difficult defile known as the **Otira Gorge**, and across Arthur's Pass,[1] more than 3,000 feet high. The loftiest peaks of the **North Island** are in the west, and are all of volcanic origin. They lie in **one of the most remarkable volcanic regions in the world**. The most extensive plain in New

[1] This road is now being superseded by a railway with gradients of 1 in 33 and passing under Arthur's Pass in a tunnel 5·3 miles long rising from 1,585 feet at its western to 2,435 feet at its eastern end.

Zealand is that known as the **Canterbury Plains**, which occupy the middle of the South Island on the eastern side, extending for upwards of a hundred miles from north to south, with a varying breadth.

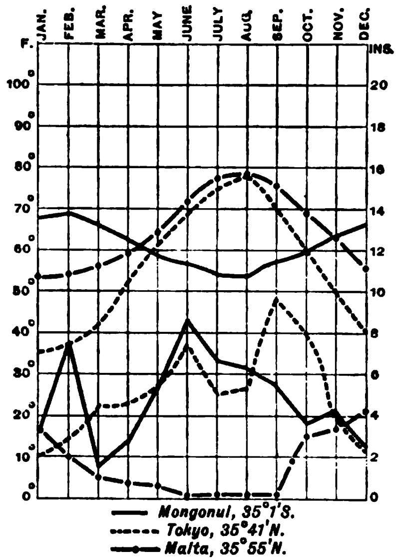
962*b*. The **rivers** of New Zealand are numerous, but the longer ones are for the most part unfit for navigation. Those of the South Island are most rapid torrents, fed in summer by the melting snows and glaciers of the Southern Alps. The chief navigable river is the **Waikato**, which drains Lake Taupo, and enters the sea on the west of the North Island. The **Molyneux**, or **Clutha**, a noble stream, draining south-eastwards three of the chief lakes at the base of the Southern Alps, is the largest river of the South Island.

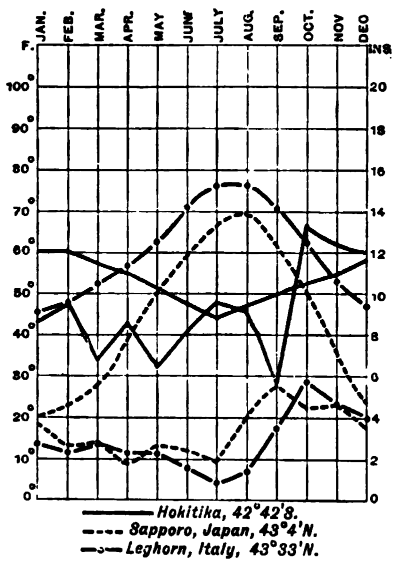
962*c*. The **climate** of New Zealand is not characterised by the liability to droughts from which so much of Australia suffers. The **winds that carry the most plentiful rains blow** from the north-west, as in the south-west of Australia, and hence the western slopes of the mountains and the plains at their base are plentifully supplied with rain, whereas the plains on the east have a much more scanty rainfall. Hence the **forests** are chiefly on the west side of the mountains, and the Canterbury Plains are the chief pastoral and agricultural region in the colony. The **temperature**, especially in summer, resembles that of England more than that of Italy, with which New Zealand corresponds in latitude. (See diagrams, opposite.) The New Zealand crops, therefore, are similar to those of England (the chief corn crops, wheat and oats), and though grapes are grown in the open air in the northern districts, wine is rarely made from them. The high average yield of wheat in New Zealand is shown in par. **141**. The more abundant rains of New Zealand cause the pastures to be richer than those of the Australian colonies, and English cultivated grasses thrive remarkably well.[1] New Zealand consequently supplies New South Wales with considerable numbers of horses and cattle, as well as butter and cheese. A further interesting illustration of the resemblance between the climate of this colony and that of England is presented by the success with which the Lincoln, Leicester, and other breeds of English sheep yielding long, strong, and lustrous wools (**203**) are reared on the New Zealand pastures. As to the trade in mutton see **355**. The **minerals** of New Zealand are of great value, the chief being **gold** and **coal**.

962*d*. The natives of New Zealand, called the **Maori**, are the most intelligent of all the natives whom the Europeans met with in any of the Australasian states. They are a brown-skinned, well-formed people, fond of tattooing themselves. Their whole number is little more than 40,000, and most of these live on the North Island.

962*e*. The capital of the colony is **Wellington**, in the south of the North Island on an inlet from Cook Strait, forming a safe and commodious harbour (Port Nicholson). It is about 1,270 miles from

[1] In 1899–1900 there were nearly 11,000,000 in New Zealand under sown grasses, against less than 600,000 in Australia (exclusive of Tasmania).





F STATIONS IN NEW ZEALAND,
ions (a) in Great Britain, (b) others
s in the Northern Hemisphere.

urves above, rainfall below.
n left, inches of rainfall on right.

Sydney. **Auckland**, on a narrow isthmus of the long peninsula of the North Island which runs out to the north-west, is the largest town in New Zealand, and was once the seat of government. It is a calling-station for steamers from San Francisco to Sydney, and as it lies on the east side of the isthmus (the west side having only a shallow harbour), vessels from Auckland to Sydney have to sail round the northern end of the island. In the South Island the chief towns are Christchurch and Dunedin. **Christchurch** is the principal town on the Canterbury Plains. It is situated a few miles from the east coast, and separated by a tunnelled hill from its port, **Lyttelton**, situated on one of the inlets of Banks Peninsula. **Dunedin** stands at the head of an inlet further south, in the old province of Otago, and is the port of the principal goldfields of New Zealand. Large ocean-vessels have to stop at **Port Chalmers**, at the mouth of the inlet. **Invercargill** is the chief town on Foveaux Strait; its port, for large vessels, is **Bluff Harbour**. **Greymouth** and **Westport** are the ports of the principal New Zealand coalfields, on the west side of the South Island. The coal obtained from the Brunner Mine and dispatched from the former port is of high quality. As a steam-coal it is said to be 20 per cent. better than the best New South Wales coal.[1]

963. NEW GUINEA, which is of about the same size as New South Wales, is the largest island in the world, with the exception of Australia. Its western half, as far as the meridian of 141° E., has long been claimed by the Dutch, but till recently its eastern half was independent. Now, however, this portion has also been declared to be under the protection of European Powers. In May 1885 the southern portion of the eastern half, together with the **Louisiade Archipelago**, was declared under British, the northern under German, influence. In September 1888 the section under British influence was formally erected into a British Crown colony, but it has been handed over to the Commonwealth of Australia.[2] The German section is now called **Kaiser Wilhelm Land**.

963*a*. The surface of the island is in many parts mountainous. The whole of the narrow south-eastern extremity (which lies almost entirely within the British protectorate) is traversed by chains of mountains, known as the **Owen Stanley Range**, with peaks upwards of 13,000 feet high. Lying within the monsoon area, the whole island receives copious rains during about half the year (36), and, like other

[1] On November 19, 1903, New Zealand adopted a preferential tariff in favour of the mother country by dividing certain imported commodities into three classes, and raising the duties on these or laying duties on them against foreigners, but not against the mother country. It may be mentioned, however, that in this list the principal imports from the United Kingdom, woollen and cotton goods, apparel and hosiery, are not included.

[2] In 1903 the Legislature of the Commonwealth passed an act providing for the administration of British New Guinea, towards which the Commonwealth is to furnish a sum not exceeding 20,000*l*. a year.

tropical countries with an abundant rainfall, New Guinea is covered with dense forests, which are one of the chief causes why the interior of the island is as yet so little known. Two great navigable rivers have indeed been ascended for hundreds of miles into the interior. One of these is the **Fly**, which forms a great delta on the western side of the Gulf of Papua in British territory. The other is the **Kaiserin Augusta**, which enters the sea near the middle of the coast-line of the German protectorate. Neither of these rivers has as yet, however, served as the means of gaining much knowledge of the land beyond its banks.

963*b*. Like other uncivilised natives of tropical countries, the inhabitants of New Guinea are very indolent. The **food-plants** which they grow are mainly such as require but little cultivation—**bananas, yams, sugar-cane, coco-nuts,** and **taro**; but in addition to these tobacco is also grown, and is indeed so highly prized that it is the chief article of barter with the natives. The trade is very trifling; the chief exports are trepang (**371**), pearl-shell (**359**), and copra (**331**). The supplies of the two former are becoming exhausted. The difficulty of obtaining labourers will probably prove a great obstacle in the way of creating export products of a more lucrative kind, such as are produced in Ceylon and Jamaica. Alluvial goldfields are worked by Europeans, chiefly in the Louisiade Archipelago.[1]

963*c*. Mission stations have existed for many years at different points of the coast now under the protection of Great Britain, and in the schools belonging to the stations many native children are educated, many of the teachers being natives of other islands of the Pacific. The seat of administration of British New Guinea is at **Port Moresby,** which lies to the east of the Gulf of Papua, and has regular steam communication with several ports in Queensland. It lies behind a long barrier reef which skirts the whole of this part of the New Guinea coast, access being obtained to it by one of the numerous deep channels by which this reef, like the Great Barrier Reef of the neighbouring coast of Australia (**937**), is crossed.

964. MELANESIA.—This name, meaning 'islands of the blacks,' is applied to several groups of small islands to the east and south-east of New Guinea, inhabited by Papuans.

The islands of New Britain, New Ireland, the Admiralty group, and others to the north of the eastern end of New Guinea, are now known by the name of the Bismarck Archipelago, and belong to Germany. These are followed south-eastwards by the **Solomon Islands,** the **New Hebrides,** and **New Caledonia.** The last-mentioned island, along with the adjacent group of the Loyalty Islands to the east, belongs to the French, who make use of it as a place of deportation for convicts and political offenders. It is skirted all round by a long line of coral reefs,

[1] Down to 1899–1900 the total value of the exports from British New Guinea never reached 70,000*l*.

which stretch for a considerable distance to the north-west, enclosing a number of small islands. **Numea** or Noumea, in the south-west of the island, is a port of call for the vessels of the French line of steamers which visit the ports of Australia. Under an agreement concluded between the British and German governments in 1885, part of the Solomon group is declared to belong to the British, part to the German sphere of influence. The German flag was hoisted on the islands of Bougainville, Choiseul, and Ysabel, but in 1899 Choiseul and Ysabel were transferred to the British sphere. The New Hebrides are under the joint protection of the British and French, neither power having the right to form settlements on the islands.

965. POLYNESIA.—This name is applied to all the small islands of the Pacific Ocean, with the exception of those already mentioned. They are almost all situated within the tropics, and the chief food of the people is the **bread-fruit**, in addition to those already mentioned as cultivated in New Guinea. The people belong to a race with a clear brown skin and smooth hair, and are a branch of the great Malay stock, to which the Maori (962*d*) also belong. Christianity has been introduced with considerable success on many of the islands.

966. The **Fiji Islands** are a group composed mainly of volcanic islands situated to the north of New Zealand, and mostly lying between the parallels of 16° and 19° S. Their total area is rather larger than that of Wales, and Viti Levu, the largest of the islands, embraces more than half the land-surface belonging to the group. The islands were ceded in 1874 by their native king to Britain, and now form a British Crown colony. Even before that time people of European origin had established plantations of tropical crops on several of the islands, and since that date the products of such plantations (chiefly sugar, but also coco-nut, maize, tobacco, coffee, and cotton) have increased very greatly, and a large trade has thus grown up. The plantation labourers are partly natives of the islands themselves; but Polynesian labourers and Indian coolies have been introduced. The chief towns of the group are seaports with fine harbours protected by coral reefs. The capital is **Suva**, in the south-east of Viti Levu. The next in importance is **Levuka**, the former capital, on a small island to the east of Viti Levu. The small island of **Rotumah**, to the north of the Fiji group, is also British and is annexed to the colony of Fiji.[1]

967. The **Tonga** and **Samoan**, or **Navigator Islands**, lie to the east of the Fiji group, and still further east are the **Cook** or **Hervey Islands**, the **Society** and **Low Islands**. In 1888 the British flag was hoisted on the Hervey group, the principal of which is Rarotonga. To the north of this group in about 9° S. lies **Penrhyn Island**, now also British, and still further north (between 0° and 5° N. and east of

[1] The total population of the group in 1891 was 124,000 (Europeans, 2,036; Fijians, about 111,000; Indians, 7,500; Polynesians, 2,300); in 1901, 118,000 (Europeans, 2,447).

160° W.) lie two other small islands now British, **Fanning Island** and **Christmas Island**. All three yield pearl-shell and copra, and are of importance as lying on the route of the telegraph cable to New Zealand and Australia (see map, pp. 540–1). In 1899 the **Samoan Islands** were divided between the German Empire and the United States, the German Empire receiving the islands of Savaii and Upolu, the latter containing the port of **Apia**, long the centre of German trade with the Pacific Islands, the chief product of which for European markets is copra. The United States obtained Tutuila with the fine natural harbour of **Pago-pago** (pronounced Pango-pango). At the same time the right of the British to the Tonga Islands was recognised. The Society Islands, of which the most important is the charming volcanic island of **Tahiti**, are under French protection, and so also are the Low Islands and the **Marquesas** group, to the north of the latter.

968. Between the equator and 15° N. are the **Pelew, Caroline**, and **Marshall Islands**, in that order from west to east, and south of the last-mentioned group the **Gilbert Islands**. The first three of these groups belong to the German Empire, which also possesses the **Marianne** or **Ladrone** Islands to the north of the Carolines, with the exception of the island of Guam. This, the largest of the group, belongs to the United States.

969. The **Hawaiian Islands**[1] are an important group of volcanic islands nearer the coast of North America, between 19° N. and the Tropic of Cancer, belonging since 1898 to the United States, in which since 1900 it holds the position of a territory. In area they are about equal to the Fiji Islands, which they resemble in the nature of their products. The chief island is **Hawaii**, on which the extinct volcano of Mauna Kea rises to the height of nearly 14,000 feet. Even before the group was annexed to the United States, sugar, molasses, and rice were admitted from the Hawaiian Islands into that country duty-free. Wheat, flour, and pork are the principal articles which the islands take in return. Under the treaty, concluded in 1876, providing for the duty-free imports just mentioned there was a rapid increase in the import of raw sugar from this group into the United States, and the increase is still going on. The plantations all belong to people of European stock, but the labourers are immigrants, mainly Japanese and Chinese. Koreans are beginning to arrive. The natives are an apparently joyous, but at heart a dispirited and dwindling race.[2] The capital, **Honolulu**, on the island of Oahu, is one of the landing places of the Pacific cable belonging to the United States.

[1] This is the sole name by which the group, long known in England as the Sandwich Islands, is known in the United States, and it is consequently tending to displace the English name entirely.

[2] At the census of 1900 the total population of the group was 154,000, of whom 59 per cent. were foreign born. Of the foreign population 71 per cent. were Japanese, nearly all the remainder Chinese.

TRADE ROUTES

970. Goods are conveyed by sea from any seaport from which it is possible to obtain goods which can be sold at a profit elsewhere. But the route by which the goods are conveyed to their ultimate destination depends on many circumstances, some connected with the nature of the commodities, some with the mode of conveyance—that is, whether by sailing vessel or steamer—and all, of course, connected with the relative situation of the place of origin and the destination of the commodities.

970*a*. To understand how the nature of the commodities carried affects the route, two important considerations must be borne in mind. First, it causes expense to transfer goods from one vehicle (whether ship, railway waggon, or cart) to another. It is therefore an advantage to convey goods directly from the port which serves the district where the goods are obtained to that which serves the district in which they are ultimately sold. But, second, it is cheapest to convey goods in the largest possible vessels, provided that those vessels can be filled. This frequently makes it cheaper on the whole to incur extra costs in unloading and reloading (handling expenses), and send goods first in smaller quantities to a great port, from which they are sent in large vessels to another great port, from which again they may be sent by sea to some other port nearer their final destination.

970*b*. It is bulky goods, and especially such as involve great labour in handling, like coal, timber, ores, and clays, that are most likely to be carried direct, for the quantity of such goods that may be required in a small district may be enough to fill a larger or smaller ship, and thus bring about the greatest possible saving in handling. That is why so many small British and Irish seaports import timber directly from abroad, why so many British seaports export coal sometimes in small vessels, and why so many small foreign seaports receive British coal, why small ports in Cornwall and Devon send off entire cargoes of China and other clays, why small Welsh ports fill vessels with slates for many destinations, and why comparatively small fishing towns in England and Scotland receive in separate ships cargoes of ice and send out ships laden with barrels of herrings.

970*c*. On the other hand, the economy of carrying in large ships explains why tea, coffee, spices, and other commodities sent from the East to the United Kingdom come almost entirely first to London, it may be in ships that are largely filled with bulky commodities. Of all

these commodities much greater quantities are used in London itself than in any other centre in the country; but great quantities are also sent away by rail from London, and great quantities by sea both to British and foreign ports with which London carries on a regular trade. The daily shipping reports show how many ships come to the large ports laden with 'general cargoes,' that is, cargoes composed of many kinds of goods brought together to get the advantage of carriage in large ships.

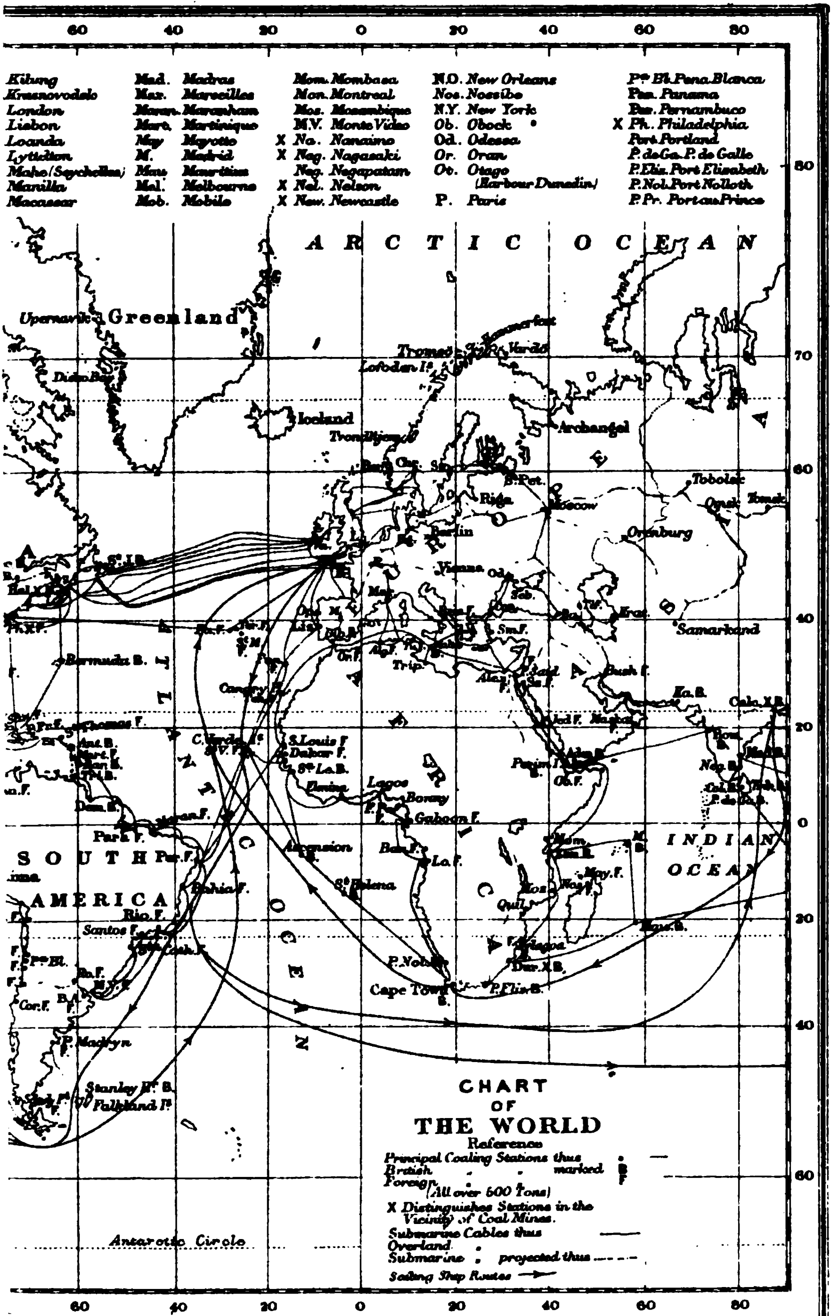
970*d*. It is obvious that the advantage of carrying in large ships will be the greater the longer the distance that goods are so carried. That is one way in which the relation of the place of origin to the destination of goods affects the route followed (**970**). It is one reason why the eastern goods mentioned come chiefly to London in the first instance, and also the reason why the great bulk of Australasian and Cape wool imported into England comes first to London, even though not a pound of it is worked up there, but all has to be sent away again either to Bradford or some other town at home or to foreign countries.

971. Then, again, the nature of the commodities may affect the route at sea by determining whether the goods are sent by sailing vessel or steamer, for which the routes in many cases differ. Perishable goods, like fresh meat, vegetables, fruit and flowers, butter and eggs, and goods of high value in proportion to their bulk, like mails, silks, watches, jewellery, ornamental feathers and artificial flowers, are taken by the quickest routes in spite of the increased cost per mile, and may often be transferred from sea to land, and then again from land to sea if necessary, for the sake of speed.

971*a*. The goods for which **sailers** are likely to be preferred are generally those bulky goods which have already been instanced as likely to make up whole cargoes. But even bulky goods are being carried in larger and larger quantity by steamers, not only in consequence of the saving of time and the greater certainty with which their arrival can be counted on, but also because steamers can in many cases carry even bulky goods as cheaply, or nearly as cheaply, as sailers. This is partly because bulky goods, if heavy, are often valued as ballast, and partly because steamers are on the average larger than sailers. Sailers are, however, still much employed, and for distant voyages even very large sailers.[1] Hence it is important to note how their routes are more or less governed by the prevailing or constant winds.

971*b*. A careful study of the facts mentioned in paragraphs **35–35*b*** will thus throw light on the routes of sailing ships as shown on the accompanying map. A vessel taking the outward route from the English Channel to New Zealand, it will be observed, keeps well to the east of the Azores so as not to have south-westerlies as head-winds

[1] The largest sailing vessel yet built, the *R. C. Rickmers*, a five-master capable of carrying about 8000 tons dead weight, was launched at Geestemünde in 1906. It is, however, provided with auxiliary steam-engines for propulsion.



...rk, Bombay & Calcutta.

and so as to get the benefit of the north-east trades as soon as possible. After crossing the belt of calms and variable winds the vessel makes for the coast of South America, at first at right angles to the south-east trades, and afterwards, from about 21° S., getting the benefit of the winds that circulate round the 'horse latitudes' of the South Atlantic—that is, the area of high pressure in about 30° S., round which the winds blow in a direction opposite to the movement of the hands of a watch. These winds, blowing, in the west of the area referred to, from about 20° to 30° or 35° S., parallel to the coast of South America, ultimately bring the vessel to the 'roaring forties,' which carry her steadily eastwards south of the Cape of Good Hope and Tasmania to New Zealand. On the homeward voyage the same winds carry the vessel south of Cape Horn, after which the vessel stands well out to sea and sails northward through the middle of the Atlantic more or less obliquely to both trade winds, and, keeping well to the west of the Azores, has a good chance of favourable winds up to the Straits of Dover in the region of the prevailing south-westerlies.

971*c*. The outward route to Calcutta is much the same as that to New Zealand, though two or three degrees further north, till near the meridian of 60° E. This course is pursued in order to benefit by the 'roaring forties' as long as they are serviceable, and also in order to avoid the adverse winds which would be encountered if a more direct course were taken from the Cape. The course shown on the map is that of the northern summer, when the vessel gets the benefit of south-westerly winds from about the equator, but there is an interesting variation in the outward route in the northern winter. Then the easterly course is continued a few degrees further east, and the vessel before crossing the equator sets north-eastwards till the meridian of about 92° E. is reached to the west of the north end of Sumatra, after which it sails in a somewhat north-westerly direction across the north-east trades (winter monsoon). The homeward route both summer and winter is southerly till after the equator is crossed, then obliquely across the south-east trades and close to the Cape, the vessel getting the benefit along the south coast of Africa of a current with a westerly set. After leaving the Cape the vessel has the south-east trades blowing astern until she crosses the equator.

971*d*. For Bombay the differences in the outward routes of the northern summer and winter are even more striking. In summer the course is northerly from about the tropic of Capricorn, a little to the east of 50° E., and begins to be more or less north-easterly before the equator is crossed (to the west of the Admiralty Isles and Seychelles), the full benefit of the south-west monsoon being thereby obtained. In winter, on the other hand, a more or less easterly course is followed to about the meridian of 75° E., then a northerly one from about 30° to 5° S., then north-easterly to a few degrees south of the south end of Ceylon, and finally north-westerly parallel to the south-west coast

of India and thus obliquely across the north-east trades. Both in summer and winter the homeward route is first parallel to the same coast, then south-westwards, finally coinciding with that from Calcutta.

971e. To San Francisco the outward route is at first the same as to New Zealand, but continues roughly parallel to the coast of South America all the way to Cape Horn, after which the vessel sails first northwards across the 'roaring forties' till the south-east trades begin to blow her north-westwards, and the same general direction is on the whole maintained until the vessel reaches a latitude at which it may take advantage of the westerly winds blowing on the north of the horse latitudes of the North Pacific to be carried inwards to San Francisco. In this (northern) hemisphere the circulation round the horse latitudes is in the same direction as the movements of the hands of a watch. On the homeward voyage the vessel in the southern hemisphere keeps well out to sea so as to pass to the west of the southern horse latitudes, the centre of which is in about 120° W. The most striking route of all is that from San Francisco to Callao in Peru, which is to a large extent the same as that from San Francisco to Cape Horn, but passes round the horse latitudes, the vessel going with the wind first south (more than 20° south of its destination), then east, then north.

972. Steamer routes are almost independent of winds and currents. Where practicable, the shortest route from port to port is adopted by steamers, and that is a route following an arc of a great circle of the earth, in other words, a circle of which the centre of the earth is the centre. Hence where the route is from north to south or the reverse a meridian is followed, but where the route is from east to west it is only on the equator that the route lies along a parallel of latitude. As these parallels become shorter and shorter towards the poles, the shortest or **great circle routes** deviate more and more from the parallels as the poles are approached. The further north an east to west route lies in the northern hemisphere the more will it curve towards the north from the parallel connecting places at the ends of the route, in the opposite hemisphere the more will it curve to the south as one nears the south pole. In the northern hemisphere if the route is to a port lying north-east of the starting-point, the great circle route will be represented on a map drawn on Mercator's projection [1] by a curved line lying to the north-west of the straight line connecting the starting-point with the destination; if the course is from north-west to south-east, the curve will lie to the north-east of the line joining the two ends. If the course is from south-west to north-east in the southern hemisphere the curve on the map will lie to the south-east, and if from north-west to south-east it will lie to the south-

[1] Mercator's is the only projection on which all directions referred to points of the compass are shown by straight lines. That is why this projection is nearly always used for marine charts.

west of the respective straight lines joining the points of departure and arrival.

972*a*. It is only on a globe that great circle routes can be at once seen and measured. This is done by means of a flexible strip of brass called a quadrant, marked in degrees of the earth's equator according to the scale of the globe for which it is constructed. Each degree represents 60 nautical miles,[1] the unit in which ocean distances are usually stated.

972*b*. To take great circle courses, however, is not always practicable. The relations of sea and land may prevent it, and so also may the character of the climate. For example, the great circle route from Cape Town to Wellington, New Zealand, goes to the south of the Antarctic Circle, and for that reason a more northerly though longer route is preferred.

972*c*. Among frequented ocean routes those in which great circle sailing causes the most marked deviation from the parallels of latitude are those of the North Pacific, where very wide stretches of ocean have to be crossed between the ports of North America and those of eastern Asia. Yokohama is in a more southerly latitude than San Francisco, yet a steamer sailing for Yokohama from San Francisco begins by sailing north-westwards, and describes a curve which rises to about 47° N. The route from Vancouver or Puget Sound to Yokohama passes just south of the Aleutian Islands. In the narrower waters of the North Atlantic the rise of the east-west great circle routes to the north of the parallels is not so striking, especially since Newfoundland lies in the way on any great circle from the south of Ireland to any American port north of Cape Hatteras. The trend of the coast-line south of that cape is almost on the line of a great circle passing thence to the south of Ireland, and hence it happens that the routes from all American ports from Nova Scotia to the Gulf of Mexico are almost identical from about the meridian of 60° W. eastwards to the English Channel, and this is accordingly the busiest tract of the ocean.[2] To reduce the risk of collision in this busy tract different lines of steamers adhere with great precision to certain limits, and adopt slightly different routes on the outward and homeward voyages.

973. On busy routes through different oceans the route is chiefly determined by the relations of sea and land, but are slightly modified by the position of **coaling stations.** Next to the North Atlantic route, the most frequented is that through the Suez Canal, which is the meeting-place of all European and North Atlantic lines to East Africa and the Far East, and most of those to Australia and New Zealand. The part from the Straits of Gibraltar to the mouth of the Gulf of Aden is common to most of the lines following these routes. On this

[1] One nautical mile = 1·1507 statute mile.
[2] See the map of Ocean Traffic in the pocket.

section the chief coaling-stations are Gibraltar, Algiers, Port Said, and Aden. These coaling-stations are also great entrepôts. At Gibraltar and Port Said many goods are landed by vessels entering the Mediterranean from the west or east respectively for ports of the Mediterranean or the Black Sea, at which the vessels landing the goods do not call. Algiers is a convenient entrepôt on account of its intimate relations with Marseilles (about 410 nautical miles distant). Aden is a place at which goods for East Africa can be dropped by steamers belonging to eastern Asiatic and Australasian lines, and goods from East Africa can be picked up by steamers of the same lines. Colombo is the coaling-station and entrepôt where the lines diverge that pass round the south of Australia. Singapore is the chief coaling-station and entrepôt, and Batavia a minor but still important port for vessels going further east, and at one or other of these the lines diverge that go round the north of Australia. The main route to the east continues on to Hong-Kong, Shanghai, Nagasaki, and Yokohama, all great coaling-stations and the first two great entrepôts, Hong-Kong for southern China, and Shanghai for the Yangtse valley and northern China. Important branch lines proceed from Singapore to the ports of Indo-China, to North Borneo and to Manila in the Philippine Islands.

973*a*. In the North Atlantic Ocean St. Vincent in the Cape Verde Islands is an important coaling-station both on the route to Cape Town and that to all the South American ports south of Cape St. Roque. Norfolk, on the coast of Virginia, a place of shipment of the excellent steam-coal of the Pocahontas coalfield (**896**), about 400 miles by rail distant, is a place frequently visited for coal by vessels returning from the Gulf of Mexico on the English Channel or the Irish Sea. St. Thomas and St. Lucia in the West Indies are coaling-stations visited on routes from North to South America or from Europe to Central and the north of South America, and St. Michael in the Azores may serve the same purpose both for steamers plying between north-western Europe and the West Indies and between North America and the Mediterranean.

973*b*. In the South Atlantic the chief coaling-stations are Cape Town and Buenos Aires, both of which obtain their steam-coal chiefly from Cardiff. On the American seaboard of the Pacific there is no great coaling-station between San Francisco, which gets its coal mainly from the coal-mines of Vancouver Island, and Conception Bay in Chile, where coal-mines exist close to the sea (**930**). Honolulu is a coaling-station on the routes from western North America to Australia and New Zealand.

974. The tonnage of shipping required to carry on the ocean commerce of the world has no direct relation to the value of the traffic. 'Valuable,' as an epithet applied to goods, implies that the goods are of small bulk in comparison with their value. The quantity of shipping employed in ocean commerce is determined, therefore, chiefly by two

things—the amount of traffic in bulky goods, such as those mentioned in paragraph 970*b*, and the amount of passenger traffic. This must be kept in mind in examining the map in the pocket showing the world's ocean commerce. The great relative thickness of the band representing the traffic of the North Atlantic route is at once intelligible when one considers the enormous amount of traffic on that route in passengers, grain, and other food-stuffs and raw materials. The prominent place taken by Great Britain in particular is accounted for by its enormous exports of coal [1] and imports of timber, grain and flour, and iron ore, as well as its passenger traffic. It should be noted, too, that the amount of the export of some bulky commodities is liable to great fluctuations, so that some of the minor features of such a map as this would vary considerably from year to year.[2]

975. The most important **land routes** connecting England with the Continent, used for passengers, mails, and perishable and valuable goods, necessarily start from London, and are interrupted by the sea. The outports on the shortest sea-routes are Dover and Folkestone, connecting England with France by Calais and Boulogne respectively. The Dover-Calais route is shortest of all,[3] being only 22 nautical miles as against 25 on the Folkestone-Boulogne route, but Boulogne has the advantage of being 27 statute miles nearer Paris. Dover also connects with Ostend (68 nautical miles). Other important outports are Harwich, from which steamers belonging to the Great Eastern Railway run to Antwerp (140 nautical miles), the Hook of Holland (the outport of Rotterdam, 101 nautical miles), and Esbjerg in Denmark (350 nautical miles); Newhaven, whence the London, Brighton, and South Coast Railway runs steamers to Dieppe (76 miles) for Paris; and Southampton, from which the London and South-Western Railway runs steamers to Havre (122 miles), Cherbourg (98 miles), and St. Malo. Regular steamers also run in connection with the Chatham and South-Eastern Railways from Queenborough in the Isle of Sheppey to Flushing in Holland (108 miles), but this trade is reckoned as belonging to the port of London.

976. Paris is the great focus for the routes touching the coast of

[1] In 1907 the quantity of coal exported by the United Kingdom was 66 million tons, as against 5·2 million tons of iron and steel manufactures, the export next in order of quantity. In the same year the quantity of timber imported was probably equivalent to upwards of 12 million tons, the quantity of grain and flour imported was 10·46 million tons and that of iron ore 7·6 million tons.

[2] Thus in the fiscal year ending March 31, 1899, the amount of wheat exported from India (mainly from Karáchi and Bombay) was nearly a million tons, in 1899–1900 less than half a million tons, in 1900–1 only 2,500 tons, and in 1904–5 considerably more than two millions tons.

[3] On this route two projects are now being urged for getting rid of the necessity of handling goods at both ends of the sea-crossing. One is to establish a train-ferry, that is, to provide steamers equipped for the carriage of loaded trains, and the other is to pierce a tunnel under the straits. In the meantime the tunnel scheme is in abeyance, a bill for the construction of such a tunnel presented to the British Parliament in 1907 having been thrown out.

France at all the ports from Calais to Havre, the railway distances to that centre being from Calais by Boulogne and Amiens 185 miles, from Dieppe 121 miles, and from Havre 141½ miles. At Paris there is a break between the terminus of any of the main lines entering the city and any other involving a journey through the city of about three miles to establish a connection between lines running in opposite directions.

977. From Paris two main railways proceed southwards, one passing to the west the other to the east of the Central Plateau. Of these two railways the western proceeds first south to Orléans, then descends the right bank of the Loire to Tours, there crosses the Loire, and continuing southwards by an ancient route up the valleys of the Vienne and Clain passes Poitiers and afterwards goes by Angoulême, Libourne, where it bridges the Dordogne, Bordeaux, where it bridges the Garonne, and Bayonne to the Spanish frontier at the west end of the Pyrenees. With a break of gauge[1] (**655**) this railway connects Paris with Madrid (901 miles by the Segovia, 905 by the Avila, route) and Cadiz, the port for Moroccan mails.

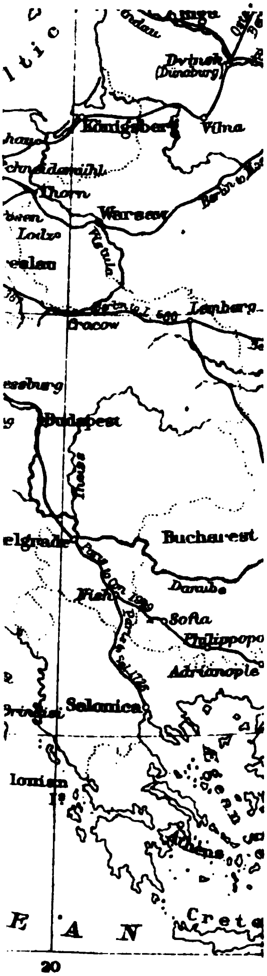
978. The eastern of the two lines mentioned in par. **977** first runs south-eastwards up the valleys of the Seine, Yonne, and Armançon, then tunnelling Mont Tasselot between the Côte d'Or and the Plateau of Langres it descends on Dijon. From this point it runs south to Châlon, and then keeping close to the right bank of the Saône passes Mâcon and reaches Lyons. There it crosses to the left bank of the Rhone, and continues southwards in sight of the Cevennes on the right and the Alps on the left through Vienne, Valence, Avignon, and Arles. At Arles it leaves the Rhone and runs south-eastwards to Marseilles, a distance of 586 miles from Paris, 697 from Boulogne, and 724 from Calais.

978*a*. From Tarascon a branch crossing the Rhone passes south-west through Nîmes and Narbonne to the east end of the Pyrenees, and there connects with the Spanish line to Barcelona and the towns of eastern Spain.

978*b*. More important branches diverge on the east side of this route. First, from Dijon runs the line which now forms the shortest route to Milan (519 miles from Paris, 707 miles from Calais). This line runs south-east to Pontarlier, crosses the Jura at the Col de Jougne, descends to Lausanne, and then, following the Lake of Geneva and the valley of the Rhone to Brig, crosses the Alps in the Simplon tunnel (**603**), and descending the valley of the Rio Toce past Domodossola proceeds onwards by the south end of the Lago Maggiore to Milan.[2]

[1] See p. 327.

[2] The Simplon route to Paris has not yet been reduced to its shortest. The two chief schemes for shortening the route at present under discussion are one for making a line between Frasne and Vallorbe, and one for making a railway across the Col de la Faucille (4340 feet), a few miles north of Geneva. The



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978c. From Milan railways run west to Turin (155 miles), east to Venice (165 miles) and Trieste (320 miles; Calais to Trieste 1027 miles, as against 1116 miles from Ostend by Cologne, Frankfurt and Munich), south to Genoa (93 miles), and south-east to Bologna (135) and Florence (217 miles; from Paris by this route 736 miles).

978d. Another branch runs from Mâcon to Geneva[1] (388 miles from Paris), and another from Mâcon to the Mont Cenis tunnel. The line first runs south-east past Chambéry across an easy water-parting between the valleys of the Rhone and Isère, then up the valleys of the Isère and Arc to the tunnel (7⅝ miles long; summit 4380 feet), on the Italian side of which it descends the valley of the Dora Riparia to Turin. From Turin the line runs eastward along the southern base of the Hills of Montferrat to Alessandria, and thence to Piacenza, whence the route is due south-east through Bologna along the base of the foothills of the Apennines to Ancona, and then near the coast by Foggia to Brindisi. The distance of this port from Paris is 1169 miles, from Calais 1357 miles, and from London 1460 miles. A branch from Alessandria runs south to Genoa, then skirts the Italian coast and passes through a large number of tunnels on its way to Pisa. From there one may diverge up the valley of the Arno to Florence (743 miles from Paris) and proceed by Arezzo, the Val di Chiana, and the valley of the Tiber to Rome and thence to Naples. A shorter route from Pisa continues right onwards through the Tuscan Maremme to Rome which is by this route only 902 and Naples 1065 miles from Paris.

978e. By the different railways which are all united at Dijon a great variety of products may be conveyed by rail to London with a short sea break. Among them are raw silk, silk wares, and other eastern products, the same commodities from Italy and the Rhone valley, dates from Algeria, fresh flowers from the mouth of the Rhone valley, watches and parts of watches from the Swiss and French Jura, French wines from Burgundy, gloves from the Grenoble district and Paris, and woollen manufactures from the north of France. The principal articles sent in the other direction from Dover, Folkestone, and Newhaven are woollen and cotton manufactures and apparel, besides goods sent through the parcel post and goods of foreign and colonial origin. For exports by parcel post Dover is the leading port of the country, followed by London (no doubt largely Queenborough)

Frasne-Vallorbe scheme would substitute one side of an approximately equilateral triangle having Pontarlier as its apex for the two sides along which the railway now runs, and would effect a saving in distance of about ten miles. The Governments of France and Switzerland have agreed (1908) to hold a conference to consider the questions arising out of this matter.

[1] A project is at present being urged for the continuation of this railway by a tunnel through Mont Blanc to the Val d'Aosta (upper part of the valley of the Dora Baltea), and so to Turin, and another for the construction of an electrically-worked railway from Martigny at the sharp angle of the Rhone above the Lake of Geneva to pass under the Alps immediately to the east of Mont Blanc. The maximum gradient on this route would be 1 in 20.

and Southampton. Colonial wool is more largely exported from Dover than any one article of British origin. Marseilles, Naples, and Brindisi are all shipping and receiving places for eastern mails.

979. Less important than the main lines from Paris east and west of the Central Plateau (976) is the line which crosses the Loire at Orleans, and then goes southwards partly across the western foothills of the Plateau to Limoges, Montauban, and Toulouse (446 miles). At present there are no direct connections with Spain by means of this line, but three railways [1] across the Pyrenees are now in progress, one of which will establish a fairly direct connection between Toulouse and Barcelona, and thus provide a rapid route by Cartagena to Oran in Algeria.

980. What is known as the Orient Express route is that from Paris to Constantinople (680). It first runs up the valley of the Marne past Épernay and Châlons, then by the route of the Marne-Rhine canal past Nancy, across the north of the Vosges to Strassburg. It then crosses the Rhine and runs 48 miles northwards along the base of the Black Forest, next passes eastwards to the Neckar valley, and after winding through the most fertile and populous part of that valley past Stuttgart, goes on to Ulm on the Danube. Thence it runs eastwards past Augsburg, Munich, and Salzburg, rejoins the Danube valley at Linz, and follows that valley past Vienna, Pressburg, and Budapest to Belgrade, beyond which the route is as described in par. 680. The total length of the route to Constantinople is 1949 miles (from London 2237 miles), that from Paris to Salonica 1726 miles. The German Anatolian or Baghdad railway (712*a*), beginning at Haidar Pasha, may be looked upon as a continuation of this railway. It is on the same gauge, thus rendering possible the connection of the lines by a train-ferry.

981. To Milan, Genoa, &c., there are express routes through the St. Gothard tunnel by Calais, Ostend, Flushing, and the Hook of Holland. From Calais the route is by Amiens, Laon, Reims, and Châlons, then up the valley of the Marne, across the Plateau of Langres, then south of the Vosges to Basel, and thence by Lucerne to the St. Gothard tunnel (603) down the valley of the Ticino, across the Lake of Lugano, and finally by Chiasso (Italian frontier station) and Como to Milan. The whole distance by this route from Calais is 756 miles, against 707 miles by the Simplon route (978*b*).

981*a*. From Ostend to Milan the route is first eastwards through the plains of Belgium, past Bruges, Ghent, and Brussels to Liège, then across the margin of the hilly country of Belgium and western Prussia past Aachen to Cologne. From here it runs up the gorge and

[1] The three routes are—one connecting Pau and Oloron with Zaragoza, a second ascending the Garonne and Salat crossing the Pyrenees in about 1° 10′ E. to the valley of the Noguera Pallaresa, which joins the Segre north-east of Lerida, and the third crossing the Col de Tosa in Spain about 2° E. to the valley of the Congost, which descends nearly due south to Barcelona.

valley of the Rhine either on the left or the right bank. The left bank route is by Bonn, Coblenz, Mainz, Strassburg, and Mülhausen to Basel, the other by Wiesbaden, Frankfurt, Karlsruhe, and Freiburg-im-Breisgau to Basel, beyond which the route is the same as that from Calais. The distance from Ostend to Milan by the left bank of the Rhine is 782 miles (from Antwerp 717 miles), by the right bank 795 miles (from Antwerp 780 miles). From Flushing and the Hook of Holland the routes are the same beyond Cologne. From Flushing to Cologne the route is nearly due east to Wesel, then up the Rhine, and the distance to Milan is 567 miles by the left bank, and 580 by the right. From the Hook the route to Cologne is by Rotterdam, Dordrecht, Nijmegen, and Cleve, and the distance to Milan by the left bank of the Rhine is 751 miles, right bank 764 miles.[1]

981*b*. By these routes are conveyed to London Italian eggs, Italian, Swiss, and German silks, Italian, French, and Rhine wines, Swiss embroideries and other cotton manufactures, condensed milk, cocoa and chocolate, and large quantities of butter and fresh meat.

982. The Ostend-Vienna express route is the same as the Ostend route to Milan as far as Mainz, then up the Main valley to Frankfurt, thence south-eastwards between the highlands of the Spessart and the Odenwald, and across the Franconian Heights to Nuremberg, and onwards to Ratisbon, Passau, and Linz, all three on the Danube. Beyond Linz the route is the same as that of the Orient Express (980). The distance from Ostend to Vienna is 882 miles, from Antwerp, by the same route from Louvain, 767 miles.

983. To Berlin there are express routes from the same four ports as to Milan by the St. Gothard, namely, Calais, Ostend, Flushing, and the Hook. The shortest railway journey is that by Flushing, but the quickest from London in time is that by Ostend. This is what is called the Nord (North) Express route. To Cologne it is the same as that to Milan, but from Cologne it is either down the Rhine for 24 miles to Düsseldorf, and thence by Soest and Magdeburg to Berlin (572 miles from Ostend), or down the Rhine for 44 miles to Oberhausen, and thence by Hamm and Hanover to Berlin (576 miles). From Flushing the route is the St. Gothard route to Oberhausen, and the total distance to Berlin is 419½ miles. From Calais the route is by Lille to Brussels, from which point the route is the same as the Ostend route with the same alternatives from Cologne, the distances being 635 miles by Magdeburg and 639 miles by Hanover. From the Hook the route is by Rotterdam, Utrecht, Amersfoort, the Dutch cotton manufacturing towns of Almelo and Hengelo, and

[1] Another connection between Basel and Milan is now being made by way of the Simplon tunnel. The canton of Bern is piercing a tunnel through the Lötschberg in the Bernese Oberland in order to allow of railway communication through Bern with the Rhone valley nearly due south of Bern, and so with Brig and the Simplon.

thence to Osnabrück and Hanover, the distance to Berlin being 432 miles.

984. The Esbjerg route from Harwich is a quick route to Copenhagen and the south of Sweden. Train-ferries carry sleeping-cars across the Little Belt from Jutland to Funen (Fyen), and across the Great Belt from Funen to Seeland and Copenhagen, and also across the Sound to Malmö. By this route large quantities of bacon, butter, eggs, and other Danish produce are brought to London.

985. Berlin is the most important railway centre of the continent east of Paris. With the two ports of Stettin and Hamburg it is connected by the easiest possible railway routes running across plains unobstructed by any important river, the railway to Stettin, 83½ miles, that to Hamburg, 178 miles long. By way of Warnemünde, 140 miles from Berlin, a train-ferry connects Prussia with Gjedser in the south of Seeland in Denmark, and through Denmark with Sweden by the Copenhagen-Malmö train-ferry. In 1908 the sanction of both Prussia and Sweden was obtained for the establishment of a direct train-ferry between the two countries, to ply from Sassnitz on the island of Rügen, 170 miles from Berlin, to Trelleborg in the south of Sweden.

985*a*. From the nearest Adriatic ports Berlin is separated by the Alps, the windings through which lengthen the railway distance to Venice, by the Brenner route, to 761 miles, that to Trieste, by Vienna (446 miles) and the Semmering route, to 816 miles.

985*b*. In 1906 a shorter connection between Vienna and hence between Berlin and Trieste was opened for traffic. This is the same as the old (Semmering) route as far as Bruck at the junction of the Mürz-tal with the Mur-tal, but from this point it continues south-west instead of turning to the south-east. It then goes on to Klagenfurt, and afterwards by tunnels through the Karawanken and the Julian Alps to the Isonzo valley, which it descends to the Gulf of Trieste. The aggregate length of the tunnels in the Karawanken is nearly five miles, and the longest tunnel through the Julian Alps is nearly five miles long.

985*c*. This new Bruck-Trieste line also shortens the distance between Trieste and Steyr in Upper Austria, and with the aid of other Alpine tunnels is made use of to shorten the distance between that port and other industrial regions further west. In July 1907 the boring of a tunnel through the eastern end of the Hohe Tauern, with a length of 5·3 miles and a summit level of 4020 feet, was completed, and a railway connection thereby secured running nearly due south of Salzburg between the great east-west lines of Bruck-Innsbruck and Marburg-Franzensfeste. This makes a great reduction in the sea-distance of Salzburg, and shortens to a less extent the distances between Trieste and places in south-west Germany. Further east and north another trans-Alpine railway south of Linz leading to Selztal will, when completed, effect a shortening of the distance between

Trieste and Linz, and through Linz with Budweis, Prague, and towns further north.[1]

986. The principal eastern lines from Berlin are one running north-east to St. Petersburg, one running east to Warsaw and Moscow, and one running south-east to Breslau (208 miles), Cracow (367 miles from Berlin), Lemberg (580 miles from Berlin), and Odessa (1040 miles). To Galats on the Danube the distance is about the same. The St. Petersburg and Moscow routes both have connections with the Siberian railway (702). The railway to St. Petersburg crosses the Oder at Küstrin and the two arms of the delta of the Vistula at Dirschau and Marienburg, then runs north-east to Königsberg, thence eastwards to Vilna, and finally north-eastwards past Dvinsk (Dünaburg) to St. Petersburg—a distance of 984 miles, or 1602 miles from Ostend, 1416 miles from the Hook.

986*a*. From Berlin to Moscow there are two routes, one the same as that to St. Petersburg as far as Schneidemühl, then eastwards by Bromberg to Thorn, the other crossing the Oder at Frankfurt, and proceeding thence by Posen to Thorn. From Thorn the line goes on to Warsaw, where the Vistula is crossed, after which it runs to Moscow by Smolensk, the distance from Berlin being 1200 miles. From Moscow to Chelyabinsk the route is by Samara and Zlato-ust, and the distance is 1311 miles, so that the whole distance from Berlin to Tairen is about 6670 miles. From a point a little east of Samara a line branches south-eastwards past Orenburg and afterwards runs by the valley of the Sir to Tashkent (2100 miles), which is connected with the Trans-Caspian Railway (707). Since the opening of this line (1904) Andizhan, in Ferghana, is only 2400 miles from Moscow,

[1] The figures below show the effect of these shortenings :—

Vienna—Trieste.

Old route by Laibach—370 miles.
New route by Klagenfurt, the Karawanken, and the Isonzo valley—321 miles.

—	By Vienna and Laibach	By Budweis, Tarvis and Laibach	By Budweis, Tarvis and Udine	By Budweis and the Karawanken	By Linz, Selztal and the Karawanken
	Miles	Miles	Miles	Miles	Miles
Trieste to Prague .	587	584	541	542	485
„ Dresden .	706	703	660	661	604
„ Berlin .	816	813	770	771	714

—	Old route by the Brenner, Tarvis and Udine	By Hohe Tauern Tunnel and Karawanken	By Salzburg and the Hohe Tauern
	Miles	Miles	Miles
Trieste to Salzburg . .	433	257	—
„ Munich . .	418	—	352
„ Leipzig . .	717	—	651

whereas formerly the Ferghana cotton, in order to reach Moscow, had to be carried either 1268 miles by rail to the Caspian, across that sea to Petrofsk, and thence 1348 miles—in all 2616 miles by rail—or across to Astrakhan on the Volga, and thence by river boats.

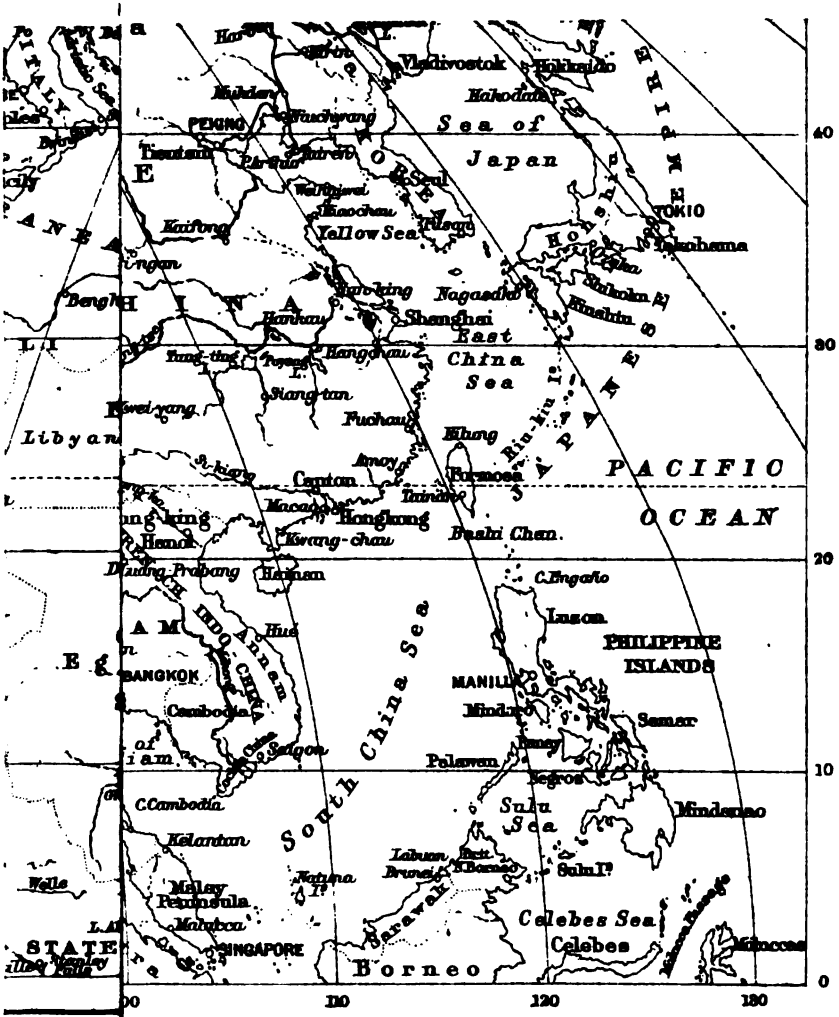
986*b*. The only products of importance that come from the Far East by the Siberian railway are tea and silks. From Siberia itself come furs and butter, the latter mainly from Western Siberia. Sometimes wheat also is conveyed from the extreme western parts of Siberia. The chief commodities carried in the opposite direction are agricultural machinery and other manufactures. Much of the Siberian butter ultimately reaches England, but generally, if not always, from a Russian port.

987. The central situation and large population of Moscow have inevitably made it a very important railway focus. Its nearest port is St. Petersburg (400 miles). Other important outlets on the Baltic are Riga (by Smolensk, 648 miles) and Windau (in Russian Vindava, 680 miles). Sevastopol (960 miles), the nearest port on the Black Sea, is now exclusively a naval port. Odessa is connected with it by two routes almost equal in length (about 1030 miles), one by Kursk and Kief, the other by Kursk, Kharkof, and Elizavetgrad.

987*a*. It is a noteworthy fact that none of the lines connecting the great towns of Russia with central and western Europe pass through the important textile manufacturing town of Lodz (633), which is moreover situated at some distance from the nearest coalfield. Lodz is 88 miles from Warsaw, and 22 miles by rail from the junction on the Warsaw-Vienna line passing through the coalfield of south-western Poland, which is at a distance of about 140 miles.

988. Of international inland waterways in Europe by far the most important is the Rhine (577*a*), and next in importance in respect of volume of traffic are those connecting northern France with western Belgium (p. 257). Among the canals that link up great rivers those which look most imposing on the map are perhaps the Ludwig's Canal, connecting the Main and Danube, and the Rhone and Rhine Canal, but the traffic carried on both of these is quite insignificant. Much more important is the Rhine and Marne Canal, which carries considerable quantities of coal in both directions and some thousands of tons of wheat and iron ore from France into Germany. Various projects for international connections of this nature along routes that seem to offer the prospect of heavy, bulky traffic of the kind suited to inland waterways are at present under consideration. Among these are the improvement of the Rhine navigation between Kehl (Strassburg) and Basel,[1] the construction of a waterway of suitable capacity for present-day requirements between Mannheim on the Rhine by way of the Neckar, its tributary the Rems, and the Brenz, a small river that joins the Danube

[1] The improvement of Swiss waterways in connection with Basel is also contemplated.


Vladivostok
Hokkaido
Hakodate
Mukden
PEKING
Sea of
Japan
Tientsin
KOREA
Seul
TOKIO
Yokohama
Kaifong
Yellow Sea
Fusan
Osaka
Hondo
Shikoku
Kiushiu
Nanking
Nagasaki
Hankau
Shanghai
East
China
Sea
Hangchau
Siang-tan
Fuchau
Kwei-yang
Amoy
Formosa
Canton
PACIFIC
OCEAN
Rin-kiu Is.
Macao
Hongkong
Tainan
Hanoi
Kwang-chau
Bashi Chan.
Hainan
C. Engaño
Luang-Prabang
Luzon
PHILIPPINE
ISLANDS
Hue
Annam
INDO-CHINA
South China Sea
BANGKOK
Cambodia
MANILLA
Mindoro
Samar
Saigon
Palawan
Panay
Negros
C. Cambodia
Sulu
Sea
Mindanao
Kelantan
Labuan
Brunei
Brit. N. Borneo
Sulu Is.
Natuna Is.
Malay
Peninsula
Sarawak
Malacca
Celebes Sea
Celebes
SINGAPORE
Borneo
Moluccas
Libyan
40
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10
0
110
120
130
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about forty miles below Ulm, and the construction of canals connecting the Danube with the Oder and with the Moldau at Budweis. The Danube-Oder Canal involves the crossing of a watershed a trifle more than 1000 feet above sea-level. The Danube-Moldau Canal would have to pass over one about 2250 feet in altitude between Linz and Hohenfurth (1865 feet), the southernmost point on the Moldau. It is proposed also to connect the Danube-Oder Canal with the middle Elbe on the one side and with the Vistula and Dniester on the other.[1] Mention may even be made of the more daring project for constructing canals capable of taking barges of about 600 tons across the Alps.[2]

989. In Africa there is as yet no through railway route. The Cape to Cairo Railway is practically being formed by the prolongation of the Nile Valley Railway (**802, 804*b***), and the Cape-Rhodesia Railway (**812**).

990. In North America the shortest trans-continental line north of the Gulf of Mexico in summer is in Canada. As yet the only railway that has a through line is the Canadian Pacific, particulars as to which are given in par. **865**. The wheat of the North-West is the chief product carried eastwards by this route, and the arrangement of the long lakes Winnipeg, Manitoba, and Winnipegosis, west of the great lakes of the St. Lawrence, must force all the traffic from that region to the south of those lakes so long as there is not a sufficiently large body of settlers in more northerly latitudes to justify the laying of a railway running from west to east to the north of the lakes. The Lake of the Woods farther east confines the traffic to the narrow belt between that lake and Lake Winnipeg, or forces it southwards into the territory of the United States through which the Canadian Northern Railway passes for a short distance. That is why most of the lines of the Canadian North-West converge on Winnipeg, and why that town is growing with such rapidity. (See the map opp. p. 472.)

990*a*. There are several routes from the eastern seaboard to the interior of North America which run partly through Canada and partly through the United States. The short line of the Canadian Pacific through Maine has already been mentioned (**865**). The Sault Ste.

[1] The construction of all these waterways was authorised and prescribed by an Act passed by the Austrian (Cis-Leithan) legislature in June 1901. Under that Act the work is all to be completed in 1924, or twenty years from the date at which it was expected that construction would actually be begun. The intervening years were to be devoted to preliminary studies, but these are taking up more time than was anticipated.

[2] This is merely in the stage of a suggestion by an engineer, Mr. Pietro Caminada, of Milan; still, even as an idea, it is worthy of notice in a work on *Commercial Geography* as an illustration of the unexpected ways in which human invention is constantly modifying the value of local conditions and place relations. The practicability of the scheme depends among other things on the efficiency of a new kind of lock. For steep gradients Mr. Caminada proposes the construction of what may be called a tube-lock. This will have the form of a tube (say, of reinforced concrete) open at the top and inclined according to the requirements of the gradient to be surmounted. A vessel introduced at the bottom of the tube by an opening which may be closed may be lifted to the top of the tube merely by introducing water.

Marie-Minneapolis branch of the same railway is re-connected with the main line a little to the west of Regina by a line which re-enters Canada at Portal, and which brings down vast quantities of Canadian wheat to be milled at Minneapolis. From Montreal to St. Paul (adjoining Minneapolis) by this route the distance is 1119 miles, and to Vancouver 2930 miles. By the Grand Trunk connection with Chicago (865), effected by means of a tunnel under the St. Clair River between Sarnia and Port Huron, Montreal is 849 and Portland, Maine, 1146 miles from Chicago. By another route New York is connected with Chicago by a line which passes over the Niagara River at Buffalo into Canada, and then re-enters the United States by Windsor and Detroit. Here the connection is also being made by means of a double railway tunnel under the Detroit River.

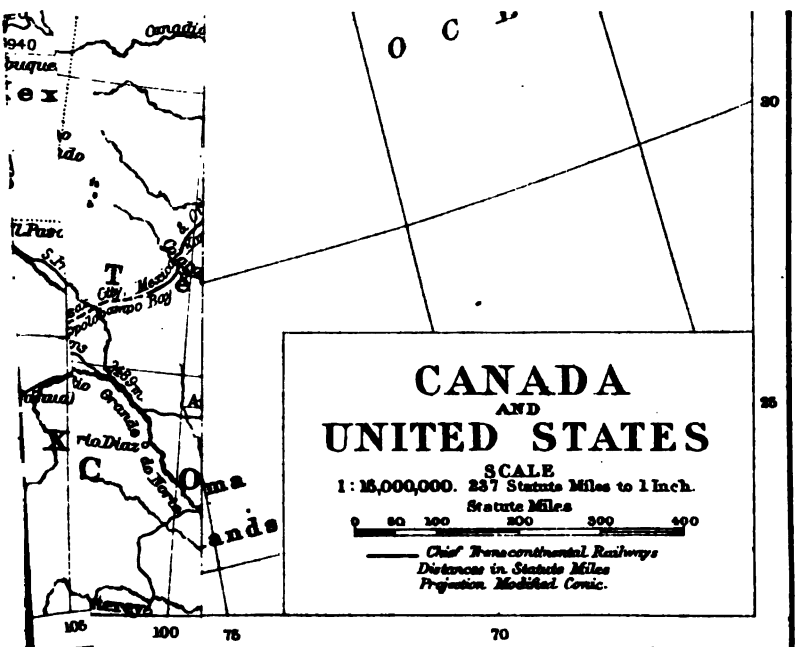
991. The trans-continental lines which lie entirely within the United States have to cross both the Appalachian system and the Rocky Mountains, which necessitate great windings and steep gradients. In the east railways on both banks of the Hudson run northwards for more than 140 miles to take advantage of the same breach in that system, the Mohawk valley, as is made use of by the Erie Canal (**888**) in proceeding westwards to Buffalo and Chicago. This deviation raises the distance between those two points to upwards of 980 miles. A shorter route, 912 miles [1] in length, connects the two places by way of Philadelphia (90 miles) and Pittsburg (444 miles), but in one part this route has an average gradient of 1 in 60 for 11 miles, and has one curve so sharp that rails weighing 100 lbs. to the yard have been worn down to 82 lbs. in fourteen months. Windings and heavy gradients occur also on the routes between Boston and Buffalo, the windings being such that even on the route through the Hoosac Mountains (**888*b***) the distance by Buffalo to Chicago is about 12 miles greater than that of the routes from New York through the same town.

991*a*. The termini both of the West Shore line running up the right bank of the Hudson and the line belonging to the Pennsylvania Railroad Company through Philadelphia to Chicago have at present to be reached by ferry from New York, but a large terminal station has been constructed by the Pennsylvania Railroad Company in the heart of the city and tunnels have been pierced under the harbour to connect the city, including Brooklyn, with the New Jersey shore.[2]

992. The connection of Chicago, and thus of the eastern seaboard, with San Francisco (or rather with Oakland, from which there is a train-ferry to San Francisco) by the completion of the Union and Central route (**864, 865**), through Des Moines and Omaha, was effected in 1869, and this was the first transcontinental connection north of

[1] The same distance as that by rail between Chicago and New Orleans.

[2] The piercing of the last of the four tunnels (two under the Hudson and two under the East River) necessary for the two tracks of the railway was finished in March 1908, but it will be some time before the lines are ready for traffic.



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the Isthmus of Panama. The total distance by this route between New York and San Francisco is 3270 miles by the Philadelphia route, 3,338 miles by Buffalo. Denver, Colorado, 1210 miles by rail from Chicago, is connected with the Union Pacific Railway at Ogden, east of the Great Salt Lake, and by this route is 1611 miles from San Francisco.

992*a*. The Northern Pacific and the Great Northern railways, whose routes are shown on the map opp. p. 472, both have for their eastern terminus St. Paul, 410 miles by rail north-west of Chicago. The distance by the Northern Pacific from St. Paul to Tacoma, on Puget Sound, is 1912 miles, to Portland 2056 miles, those from New York by Philadelphia 3234 and 3378 miles respectively. By the Great Northern Railway the distance of Seattle, on Puget Sound, from St. Paul is 1828 miles, from New York 3145 miles.

992*b*. The Atchison, Topeka, and Santa Fé railway and the Southern Pacific both establish connections with San Francisco by way of the southern half of the Californian valley. The former completes a trans-continental connection by way of St. Louis, where the Mississippi has been bridged since 1874. By the shortest railway connection with the Santa Fé system this city is 2395 miles from San Francisco, while it is 1068 miles from New York by way of Philadelphia, Pittsburg, Columbus, and Indianapolis; but the shortest connection of St. Louis with the eastern seaboard is that with Baltimore, by Cincinnati, a distance of 920 miles. The Southern Pacific connects San Francisco with New Orleans (2489 miles) and Galveston (2188 miles). With regard to all the railways mentioned in this and the two preceding paragraphs see also the table on p. 463.

992*c*. Only a comparatively small number of commodities are conveyed by these trans-continental lines from the western to the eastern seaboard. The only commodity imported in large quantity on the Pacific side for carriage to the Atlantic side is raw silk, the high value of which enables it to bear high transport charges. Great quantities of Californian fruit and of hops and apples from Oregon, Washington, and British Columbia are carried far eastward by rail and even for export to Europe; and very large timber of the kind of which British Columbia almost has the monopoly is carried by rail from Vancouver even to Halifax for shipbuilding. But the great bulk of the commodities conveyed over these lines are the products of the North-West east of the Rockies—living animals (mainly for the slaughter-houses of Chicago), grain to the lake-ports of Chicago, Duluth, Superior, and Fort William or for further transport eastwards by rail, and other agricultural products, besides ores and metals from mines in the mountains. Westwards are carried chiefly coal and manufactured goods. Considerable quantities of Hawaiian sugar are imported at San Francisco to be again despatched by sea at Galveston for eastern ports, but this is exceptional. It is for this kind of traffic, however,

that the Tehuantepec railway[1] (**913***c*), the Panama railway, and the projected Panama canal (**914***a*) are designed. An important advantage of all these last connections between the Atlantic and Pacific is the fact that the great circle route (**972**) from their Pacific termini to Japan and northern and middle China nearly follows the trend of the coast of North America as far as California, and even San Francisco is not very far out of such a direct course.

992*d*. Towards the end of 1909 a new trans-continental connection was established by the opening for freight traffic of the Western Pacific Railroad, the route of which is shown on the map opposite p. 554. Though this line has easier gradients than the Central Pacific, it is considerably longer. Another trans-continental line is nearing completion, the Kansas City, Mexico, and Orient, whose route is also shown on the map referred to. Its western terminus is in Topolobampo Bay, one of the finest natural harbours on the Pacific coast. It will furnish the shortest railway route to the Pacific for a large part of the southern states, and even from the eastern seaboard of the United States. To St. Louis the distance from Topolobampo Bay is only 1,936 miles against 2,395 miles from San Francisco; but, while this is an obvious advantage in the case of all trans-continental traffic to southern seas, it must be remembered that in the trade with the Orient there is a set-off in the longer sea-voyage, as shown below:—

DISTANCES IN NAUTICAL MILES.

From	To San Francisco	To Topolobampo Bay
Honolulu	2,100	2,880
Yokohama by Honolulu . . .	5,480	6,260
Yokohama direct	4,520	5,750

993. For the carriage of heavy and bulky traffic a project is now (1908) being discussed in the United States for the creation of a waterway of 14 feet in depth from Chicago to New Orleans so as to allow of loaded sea-going vessels passing between those ports. It is contended that the growth of such traffic is so rapid that railways in the near future will not be able to carry all the commodities that are offered for transport to the Atlantic or Gulf seaboard, although it may be possible for them to carry the goods to some point on such a waterway. A company known as the Lakes-to-the-Gulf Deep Waterway Association has been formed to promote the carrying out of this scheme, at the cost of the Federal Government.[2]

[1] Between January 26 and the end of 1907 225,000 tons of freight were carried eastwards by this railway and 125,000 tons westwards. The eastward bound traffic consisted mainly of Hawaiian sugar consigned to Philadelphia, but included 12,000 tons of canned salmon and Californian wine for New York. The freight in the opposite direction was general merchandise and structural iron for the Pacific states and the Hawaiian Islands, but the company is now (June 1908) about to begin handling freight between European ports and the west coast of North, Central and South America, and contemplates dealing with cargo between New York, New Orleans, and some parts of the far east.

[2] The total cost is estimated at £14,500,000, but the Chicago Sanitary and Ship Canal, 42 miles long, connecting Chicago with the Des Plaines river, with a minimum depth of 14 feet, which, it is proposed, shall form part of this waterway, will have cost when completed about £11,500,000.

APPENDIX.

ABBREVIATIONS.

A.H.	Austria-Hungary.
Alia.	Australasian Colonies.
Am.	America.
A. R.	Argentine Republic.
B. E. I.	British East Indies.
Bel.	Belgium.
Ben.	Bengal.
B. N. A.	British North America.
Bom.	Bombay.
Bras.	Brazil.
Bur.	Burma.
B. W. I.	British West Indies.
Cent. Am.	Central America.
Cey.	Ceylon.
Ch.	China.
Den.	Denmark.
Eg.	Egypt.
Fr.	France.
For. W. I.	Foreign (non-British) West Indies.
Ger.	Germany.
Gui.	Guiana.
Hamb.	Hamburg.
Hol.	Holland.
Ind.	India.
It.	Italy.
Jap.	Japan.
Jav.	Java.
Mad.	Madras.
Nor.	Norway.
Ph. I.	Philippine Islands.
Port.	Portugal.
Rus.	Russia.
S. Af.	South Africa.
Sp.	Spain.
Sp. W. I.	Spanish West Indies.
Swe.	Sweden.
Swit.	Switzerland.
Trip.	Tripoli.
Tur.	Turkey.
U. K.	United Kingdom.
Urug.	Uruguay.
U. S.	United States.

General Commerce = Gross Imports and Exports.

Special Commerce = Imports of Articles for home consumption, and Exports of Native Produce and Manufactures. (All articles that have paid customs duty are often included under the head of Special Commerce.)

In the tables of imports and exports, the entries in the last column under the heading Principal Countries of Origin, Principal Destinations, or Principal Articles, refer to the most recent period or the most recent year for which returns were available at the time of the construction of the tables.

The percentages in these tables are in most cases calculated on more precise values than those given in the tables.

Black type indicates high relative importance.

UNITED KINGDOM—GENERAL IMPORTS.[1]

A Principal Articles	Average Value in Millions Sterling 1861–5	1866–70	1871–5	1876–80	1881–5	1886–90	Percentages of Total Value '61–5	'66–70	'71–5	'76–80	'81–5	'86–90	Principal Countries of Origin
1. Corn, total	27·85	36·47	49·96	59·70	58·66	49·55	11·2	12·5	13·8	15·6	14·7	12·7	1. U.S., Rus., Ind., B.N.A.
Wheat, also included in corn	*14·94*	*19·46*	*26·15*	*29·31*	*28·24*	*21·47*	*6·0*	*6·5*	*7·2*	*7·6*	*7·0*	*5·5*	U.S., Ind., B.N.A., Rus.
Wheat flour " "	*3·86*	*3·46*	*4·79*	*7·10*	*10·40*	*9·08*	*1·5*	*1·2*	*1·3*	*1·8*	*2·6*	*2·3*	U.S., A.H., Ger., B.N.A.
2. Cotton, raw	54·05	59·01	52·19	37·61	43·29	41·34	21·8	20·2	14·4	9·8	10·8	10·6	2. U.S., Ind., Eg.
3. Wool: sheep, lamb, alpaca, &c.	12·76	15·87	20·10	24·25	24·73	25·76	5·2	5·4	5·5	6·3	6·1	6·6	3. Alia, S.Af., B.E.I.
4. Wood, sawn, split or hewn	11·45	11·04	15·14	15·18	14·85	14·28	4·6	3·8	4·2	4·0	3·7	3·7	4. B.N.A., Rus., Swe., Nor.
5. Sugar, raw	12·06	12·72	16·67	18·02	18·07	11·43	4·9	4·3	4·6	4·7	4·5	2·9	5. Ger., Jav., Gui., B.W.I.
6. Butter and margarine	5·19	6·41	7·51	10·34	11·72	12·55	2·1	2·2	2·1	2·7	2·9	3·2	6. Hol., Fr., Den.
7. Tea	9·23	10·82	12·24	12·22	10·98	10·24	3·7	3·7	3·4	3·2	2·7	2·6	7. Ch., Ben., Cey.
8. Silk manufactures	7·06	11·33	10·43	12·72	10·94	10·93	2·9	3·9	2·9	3·3	2·7	2·8	8. Fr.
9. Bacon and hams[2]	2·20	1·85	5·21	8·81	9·19	9·02	0·9	0·6	1·4	2·3	2·3	2·3	9. U.S., Den., B.N.A.
10. Woollen manufactures	1·71	2·54	4·16	5·88	6·49	8·74	0·7	0·9	1·2	1·5	1·6	2·2	10. Fr., Hol.
11. Wine	4·18	5·01	7·34	6·39	5·40	5·55	1·7	1·7	2·0	1·6	1·3	1·4	11. Fr., Port., Sp., Hol.
12. Coffee	3·65	4·68	6·49	6·80	4·38	3·89	1·5	1·6	1·8	1·7	1·1	1·0	12. Cent. Am., Mad., Cey., Braz., Fr.
13. Leather	—	—	2·82	3·98	5·35	6·02	—	—	0·8	1·0	1·3	1·5	13. Ind., U.S., Fr., Alia.
14. Linseed	3·52	3·74	4·42	4·56	4·52	4·36	1·4	1·3	1·2	1·2	1·1	1·1	14. Ben., Bom., Rus.
15. Sugar, refined	0·88	1·60	3·69	4·65	4·35	6·76	0·4	0·6	1·0	1·2	1·1	1·7	15. Ger., Fr., Hol.
16. Jute	1·42	1·86	3·48	3·24	3·92	4·19	0·6	0·6	0·9	0·8	0·9	1·1	16. Ind.
17. Hides	3·11	3·60	4·46	3·41	3·70	3·07	1·3	1·2	1·2	0·9	0·9	0·8	17. Ind., Bel., S. Af.
18. Flax, dressed and undressed	4·11	4·13	4·61	3·45	2·83	2·54	1·7	1·4	1·2	0·9	0·7	0·6	18. Rus., Bel., Hol.
Average total value[3]	247·6	292·8	360·2	382·5	399·9	389·6							

[1] This table and that on p. 560 are differently made up from the corresponding tables in the first edition. In the first edition the leading imports and exports at the dates with which the tables commenced (1854 and 1843 respectively) were given, but the items that have since risen to a position among the leading articles are now inserted. The changes in this respect are much greater in the import than in the export table.

[2] There has also been a large increase in the import of meat of other kinds, but the aggregate of this import cannot be gathered from the *Statistical Abstract of the United Kingdom*.

[3] In 1854–5, 148·[illegible]; in 1856–60, 18[illegible] millions.

B. Principal Countries of Origin	Percentages of Total Value 1861–5	1866–70	1871–5	1876–80	1881–5	1886–90	Principal Articles in the Order of Importance
All British Possessions	29·82	22·89	22·20	22·13	23·52	22·89	
1. United States	11·00	15·25	18·36	23·09	23·20	22·44	1. Raw cotton, grain, bacon and hams
2. France	9·75	12·01	11·56	11·13	9·55	10·43	2. Woollens, silks, butter, wine
3. British India	15·69	10·30	8·64	7·50	8·90	8·33	3. Cotton, jute, wheat, linseed, tea, rice, indigo, leather
4. Australia and New Zealand	3·35	4·31	4·80	5·86	6·49	6·48	4. Wool, gold, grain
5. Holland	3·90	4·17	3·86	5·53	6·22	6·64	5. Margarine and butter
6. Germany	6·08	6·14	5·56	6·11	6·19	6·46	6. Sugar, corn, timber, paper
7. Russia	5·85	6·77	6·15	4·67	4·51	5·48	7. Corn (wheat, oats, barley), timber, flax, wool
8. Belgium	2·23	3·03	3·87	3·19	3·64	4·09	8. Silks, woollen yarn, flax, eggs
9. North American Colonies	3·11	2·50	2·89	2·95	2·77	2·82	9. Timber, animals, cheese
10. China (including Hong-kong)	5·04	3·58	3·60	3·76	2·76	1·99	10. Tea, silk
China (excluding Hong-kong)	4·62	3·49	3·48	3·39	2·48	1·65	
Hong-kong	0·42	0·09	0·22	0·37	0·28	0·34	
11. Sweden and Norway	1·82	2·27	2·64	2·59	2·76	2·88	11. Timber, iron, oats, butter, fish
12. Spain	1·91	2·09	2·51	2·50	2·64	2·79	12. Iron and copper ores, fruit, lead, wine
13. Egypt	6·34	5·42	3·79	2·44	2·28	2·02	13. Cotton, cotton seeds, beans
14. Cape of Good Hope and Natal	0·75	0·94	1·08	1·21	1·40	1·42	14. Wool, feathers, skins, copper ore
15. Brazil	2·05	2·32	2·11	1·37	1·39	1·20	15. Caoutchouc, cotton, sugar, coffee
16. Denmark proper and Iceland	0·68	0·86	0·99	1·18	1·31	1·68	16. Butter, animals, bacon and hams
17. British West Indies and Guiana	3·14	2·10	1·85	1·76	1·30	0·79	17. Sugar, cacao, rum
18. Turkey	2·01	2·07	1·72	1·38	1·23	1·14	18. Grain, dried fruits, wool and hair, opium, valonia
19. Straits Settlements	0·83	0·68	0·85	0·74	1·11	1·29	19. Tin, pepper, cutch and gambier, gutta-percha
20. Java	—	—	0·24	0·48	0·84	0·60	20. Raw sugar
21. Italy	1·16	1·28	1·16	0·95	0·82	0·80	21. Oranges and lemons, hemp, olive oil
22. Portugal	0·88	0·87	1·16	0·90	0·81	0·74	22. Wine, cork, copper
23. Chile	1·17	1·31	1·28	0·85	0·73	0·73	23. Copper, nitrate of soda
24. Ceylon	1·24	0·68	1·03	0·92	0·57	0·67	24. Tea, coffee, cinchona, cocoa-nut oil
25. Greece	—	0·41	0·50	0·49	0·49	0·47	25. Currants
26. Austria-Hungary	0·24	0·54	0·28	0·38	0·49	0·48	26. Wheat meal and flour
27. Roumania	—	—	0·24	0·28	0·86	0·88	27. Corn (maize, wheat, barley)
28. Argentine Republic	0·49	0·43	0·51	0·32	0·29	0·65	28. Corn (maize, wheat), fresh mutton

UNITED KINGDOM.—EXPORTS OF NATIVE PRODUCE AND MANUFACTURES.[1]

A. Principal Articles	Average Value in Millions Sterling									Percentages of the Total Value of the Exports of British and Irish Produce						Principal Destinations
	'46–50	1851–5	'56–60	1861–5	'66–70	1871–5	'76–80	1881–5	'86–90	1861–5	'66–70	1871–5	'76–80	1881–5	'86–90	
1. Cotton manufactures[2]	18·75	26·03	34·98	40·07	55·92	60·20	56·06	61·16	59·63	27·7	29·7	25·1	27·3	26·3	25·2	1. Ind., Tur., Ch., Eg., Brazil, &c.
" " *including yarn*	*25·39*	*31·83*	*44·10*	*48·66*	*70·39*	*75·26*	*68·45*	*74·20*	*71·35*	*33·6*	*37·3*	*31·3*	*33·9*	*31·9*	*30·2*	
2. Iron and steel	4·91	8·90	13·33	13·92	19·75	31·35	21·41	26·79	26·79	9·6	10·5	13·1	10·6	11·5	11·3	2. Widely scattered
3. Woollen manufactures	6·97	8·82	10·84	15·70	21·18	25·87	17·16	18·83	20·41	10·8	11·2	10·8	8·5	8·1	8·6	3. U.S., and many other countries
" " *including yarn*	*8·01*	*10·41*	*13·85*	*20·13*	*26·58*	*31·52*	*20·95*	*22·46*	*24·50*	*13·8*	*14·0*	*13·1*	*10·3*	*9·6*	*10·4*	
4. Cotton yarn	6·57	6·81	9·12	8·59	14·40	15·06	12·39	13·04	11·72	5·9	7·6	6·2	6·1	5·6	5·0	4. Ind., Ger., Hol., Jap.
5. Machinery and steam engines	0·98	1·71	3·55	4·54	4·97	8·60	7·59	11·89	13·18	3·1	2·6	3·6	3·7	5·1	5·6	5. Widely scattered
6. Coal, cinders, and fuel	1·08	1·77	3·16	3·98	5·39	10·30	7·93	10·09	13·03	2·7	2·8	4·3	3·9	4·3	5·3	6. Fr., It., Ger.
7. Apparel, slops, haberdashery and millinery	1·86	4·57	5·90	6·79	7·13	9·16	6·85	7·42	6·73	4·7	3·8	3·8	3·4	3·1	2·8	7. Alia, S. Af., Fr.
8. Linen manufactures	3·20	4·26	4·58	6·56	7·63	7·48	5·66	5·47	5·55	4·5	4·0	3·1	2·8	2·3	2·3	8. U.S., Alia, For. W. I.
" " *including yarn*	*3·92*	*5·28*	*6·29*	*8·86*	*9·97*	*9·46*	*6·86*	*6·52*	*6·45*	*6·1*	*5·2*	*3·9*	*3·4*	*2·7*	*2·7*	
9. Leather and leather manufactures	—	—	—	2·39	2·32	3·65	3·30	4·04	3·97	1·6	1·2	1·5	1·6	1·7	1·7	9. Widely scattered
10. Woollen and worsted yarn	1·04	1·59	3·01	4·43	5·40	5·65	3·79	3·63	4·17	3·0	2·8	2·3	1·8	1·5	1·8	10. Ger., Hol., U.S., &c.
11. Hardware and cutlery	2·24	3·20	3·72	3·39	3·61	4·54	3·33	3·54	2·94	2·3	1·9	1·9	1·6	1·5	1·2	11. Alia, U.S., Ger., Fr.
12. Copper, wrought and unwrought, including mixed or yellow metal	—	—	—	3·18	2·95	2·97	3·10	3·40	3·22	2·2	1·6	1·2	1·5	1·4	1·4	12. Ind., Fr., Ger., Hol.
13. Silk manufactures, from 1861	—	—	—	1·38	1·19	1·99	1·83	2·36	2·39	0·9	0·6	0·8	0·9	1·0	1·0	13. U.S., Fr., Ind.
14. Jute manufactures, from 1861	—	—	—	0·28	0·61	1·43	1·78	2·32	2·26	0·1	0·3	0·6	0·8	1·0	1·0	14. U.S., Ger., Braz., A.R.
15. Earthenware and porcelain	—	—	1·35	1·31	1·72	1·99	1·86	2·13	2·10	0·8	0·9	0·8	0·9	0·9	0·9	15. U.S., B.N.A.
Average total value[3]	60·89	88·87	124·2	144·4	187·8	239·5	201·4	232·3	236·3							

[1] See page 558, note 1.

[2] In 1785 the estimated value of the cotton piece goods exported from the United Kingdom was 5·4 per cent. of the total value of the exports, in 1815 33 per cent.

[3] In 1843-5, £56·95; in 1846-50, £60·89 millions.

UNITED KINGDOM.—EXPORTS OF NATIVE PRODUCE AND MANUFACTURES.

	B. Principal Countries	Percentage of Total Value 1843–5	1861–5	1866–70	1871–5	1876–80	1881–5	1886–90		Principal Articles in the Order of their Importance
	All British Possessions	*31·08*	*32·54*	*26·97*	*26·84*	*33·49*	*35·00*	*34·36*		
1.	British India	12·20[1]	12·36	10·64	8·87	12·20	12·92	13·49	1.	Cottons, metals
2.	United States	11·78	10·62	13·28	13·25	9·82	11·58	12·50	2.	Iron, woollens, cottons, linens, alkali
3.	Australia	1·9	8·35	6·24	6·71	8·91	10·33	9·61	3.	Metals, apparel, woollens, cottons
4.	Germany	11·8	10·08	10·89	11·22	9·40	7·74	7·20	4.	Yarns, machinery, metals, coals, herrings
5.	France	4·6	6·09	6·13	7·05	7·52	7·20	6·22	5.	Woollens, coals, metals, yarns
6.	Holland	5·9	4·68	5·41	6·28	4·89	4·08	3·80	6.	Cotton and woollen yarn, metals
7.	North American Colonies	4·9	3·15	3·14	3·79	3·43	3·71	3·30	7.	Iron, woollens, cottons, apparel
8.	China (including Hong-kong)	3·6	3·00	4·47	3·68	3·83	3·49	3·53	8.	Cottons, woollens, cotton yarn, metals
	China (excluding Hong-kong)	*1·2*	*1·97*	*3·13*	*2·32*	*2·23*	*2·07*	*2·48*		
	Hong-kong	*2·4*	*1·03*	*1·34*	*1·36*	*1·60*	*1·42*	*1·05*		
9.	Belgium	2·3	1·53	1·84	2·63	2·74	3·42	3·02	9.	Woollen goods, cottons and cotton yarn
10.	Italy	—	3·94	2·89	2·79	2·85	2·91	2·98	10.	Coals, cottons and cotton yarn
11.	Turkey	—	4·02	3·84	2·86	3·30	2·80	2·50	11.	Cottons
12.	Brazil	4·1	3·34	3·26	2·99	2·96	2·75	2·69	12.	Cottons, metals
13.	Cape of Good Hope and Natal	0·92	1·30	0·88	1·62	2·57	2·33	2·74	13.	Apparel, metals, cottons, machinery
14.	Russia	3·6	1·88	2·64	3·26	3·23	2·25	2·07	14.	Machinery, coals
15.	Argentine Republic	—	1·00	1·30	1·30	1·03	1·97	3·23	15.	Metals, machinery, cottons
16.	Sweden and Norway	0·48	0·89	0·86	1·71	1·67	1·57	1·67	16.	Coals, metals
17.	Spain	0·91	2·01	1·20	1·50	1·68	1·56	1·63	17.	Coals, machinery
18.	Egypt	0·55	2·92	4·10	2·25	1·22	1·32	1·28	18.	Cottons, coals
19.	British West Indies and Guiana	4·3	2·22	1·43	1·31	1·37	1·25	1·23	19.	Cottons, apparel
20.	Straits Settlements	—	0·86	1·02	0·93	1·02	1·07	1·06	20.	Cottons
21.	Japan	—	0·32	0·76	1·75	1·26	1·00	1·49	21.	Cottons and cotton yarn, woollens, metals
22.	Denmark proper and Iceland	0·47	0·68	0·80	0·94	0·90	0·91	0·89	22.	Coals, metals, cottons
23.	Chile	1·65	0·97	1·17	1·11	0·74	0·91	1·00	23.	Cottons, iron, woollens
24.	Java	0·65	0·59	0·58	0·45	0·87	0·86	0·61	24.	Cottons
25.	Portugal	1·88	1·37	0·95	1·02	1·05	0·84	0·92	25.	Cottons, metals, coals
26.	Greece	—	—	—	0·39	0·44	0·48	0·42	26.	Cottons
27.	Roumania	—	—	—	0·41	0·39	0·46	0·46	27.	Cottons and cotton yarn
28.	Austria-Hungary	0·93	0·54	0·64	0·54	0·39	0·35	0·43	28.	Cottons and cotton yarn
29.	Ceylon	—	0·51	0·47	0·44	0·46	0·30	0·31	29.	Cottons, coal, metals

[1] To the British East Indies generally.

UNITED KINGDOM.—EXPORTS OF FOREIGN AND COLONIAL MERCHANDISE (EXCLUSIVE OF TRANSHIPMENTS).

4. Principal Articles	Average Value in Millions Sterling							Percentages of Total Value of Exports of Foreign and Colonial Merchandise						Principal Destinations
	1856–60	1861–5	1866–70	1871–5	1876–80	1881–5	1886–90	1861–5	1866–70	1871–5	1876–80	1881–5	1886–90	
1. Wool	2·20	4·29	6·08	9·62	12·79	15·26	18·91	9·2	12·0	16·5	22·6	24·2	22·4	1. Fr., Bel., U.S., Ger., Hol.
2. Cotton, raw	4·06	16·38	12·63	8·18	4·35	5·27	5·17	35·3	20·9	18·9	7·7	8·3	8·3	2. Ger., Rus.
3. Coffee	0·85	2·36	3·48	5·20	5·37	3·48	2·78	5·1	7·4	8·9	9·5	5·4	4·5	3. Hol., Ger.
4. Tea	0·52	1·98	2·47	2·82	2·47	2·39	1·84	4·3	5·3	4·8	4·3	3·8	3·0	4. Ger., U.S. & B. N.A., Hol., Rus.
5. Rice, not in the husk	0·65	0·95	1·08	1·95	2·01	1·72	1·29	2·0	2·8	3·3	3·5	2·7	2·1	5. Sp. W.I., Tur.
6. Hides	0·83	0·90	0·89	1·46	1·28	1·65	1·48	1·9	1·9	2·5	2·2	2·6	2·3	6. Ger., Hol., U.S.
7. Indigo	1·75	1·90	1·97	1·84	1·32	1·65	1·12	4·1	4·2	3·1	2·3	2·6	1·8	7. Ger., Hol., U.S.
8. Caoutchouc	—	0·18	0·33	0·59	0·82	1·25	1·42	0·4	0·7	1·0	1·4	1·9	2·3	8. U.S., Ger., Rus.
9. Jute	—	0·20	0·37	0·68	0·81	1·13	1·41	0·4	0·8	1·1	1·4	1·8	2·3	9. Ger., Fr.
10. Wine	0·82	0·67	0·59	0·87	0·64	0·57	0·59	1·4	1·3	1·5	1·1	0·9	1·0	10. Ind., Alia, &c.
11. Silk, raw	2·19	4·20	3·14	3·28	1·50	0·47	0·20	9·0	6·7	5·6	2·6	0·7	0·3	11. Fr.
12. Sugar, unrefined	0·58	0·47	0·81	0·38	0·52	0·37	0·54	1·0	0·7	0·6	0·9	0·6	0·9	12. U.S., &c.
13. Wheat	0·10	0·15	0·19	0·35	0·45	0·41	0·22	0·3	0·4	0·6	0·8	0·6	0·3	13. Sp.
14. Tobacco, manufactured & unmanufac.	0·52	0·66	0·70	0·77	0·53	0·41	0·44	1·4	1·5	1·3	0·9	0·6	0·7	14. W. Af.
Average total value	24·77	46·48	46·90	58·18	56·57	63·04	62·20	24·4[1]	20·0[1]	19·5[1]	21·5[1]	21·3[1]	20·8[1]	
Average total value of gross exports	148·9	190·8	284·7	297·7	258·0	295·3	298·5							

[1] Percentage of gross exports belonging to articles of foreign and colonial origin.

B. Principal Countries	Percentage of Total Value						Principal Articles
	1861–5	1866–70	1871–5	1876–80	1881–5	1886–90	
1. Germany	18·44	19·22	18·28	18·32	18·89	18·56	1. **Wool**, raw cotton, tea, hides, coffee
2. France	29·13	25·94	22·02	21·24	17·42	12·40	2. **Wool**, jute
3. United States	8·00	5·60	6·85	7·84	13·16	19·82	3. Wool, woollen manufactures, tin[1]
All British Possessions	*7·68*	*7·78*	*8·72*	*10·13*	*11·63*	*11·46*	
4. Holland	12·69	12·97	12·99	11·04	10·97	10·58	4. Wool, coffee, cotton[2]
5. Belgium	7·02	9·85	12·05	11·74	10·24	9·65	5. Wool, raw cotton
6. Australasia	2·06	1·92	2·52	3·34	4·49	4·35	6. Silks, leather wares
7. Russia	5·79	6·93	5·19	4·73	4·19	4·50	7. Raw cotton, caoutchouc
8. British India	1·53	1·90	1·93	2·42	2·51	2·21	8. Metals and manufactures of metals
9. Sweden and Norway	1·49	2·07	2·77	3·18	2·45	2·64	9. Raw cotton, bacon and hams
10. North American Colonies	1·57	1·71	1·46	1·19	1·59	1·84	10. Tea
11. Italy	2·47	2·19	2·21	1·98	1·54	1·34	11. Hides, coffee
12. Spain and Balearic Islands	1·70	1·49	1·42	1·30	1·47	1·11	12. Raw cotton, bacon and hams
13. Turkey	0·60	0·63	0·78	0·83	1·00	0·91	13. Coffee, rice

NET IMPORTS AFTER DEDUCTION OF PRINCIPAL RE-EXPORTS.[3]

	Value in Millions Sterling						
	1856–60	1861–5	1866–70	1871–5	1876–80	1881–5	1886–90
Raw cotton	27·17	37·67	46·38	44·06	33·26	38·02	36·16
Wool	7·43	8·47	9·84	10·48	11·46	9·47	11·85
Tea	5·05	7·25	8·35	9·42	9·75	8·59	8·40
Jute	—	1·22	1·49	2·80	2·48	2·79	2·78
Hides	2·46	2·21	2·71	3·00	2·13	2·05	1·64
Caoutchouc	—	0·31	0·74	1·02	0·85	0·33	1·25
Rice	0·83	0·95	1·26	1·19	1·36	1·28	1·09
Coffee	1·04	1·29	1·15	1·29	1·43	0·95	1·11
Indigo	0·52	0·51	0·71	0·48	0·47	0·75	0·60

[1] Next in value to tin came, in 1886–90, various other articles, including caoutchouc, indigo, hemp, hides, manufactured iron, rags, spices, feathers, precious stones, tea, raw cotton, all exported to the value of more than 100,000*l.* [2] Next in value came, in 1886–90, hides, indigo, palm-oil, leather, each to the value of more than 200,000*l.*

[3] These are not the leading net (special) imports of the United Kingdom, there being several important commodities of which almost the entire import is retained for home consumption. Comp. pp. 558 and 562.

TABLE SHOWING PRINCIPAL IMPORTS INTO IRELAND IN THE YEARS 1904 TO 1909.

(*From Reports on the Trade in Imports and Exports at Irish Ports, issued* 1909 *and* 1910.)

Values in million £.

Commodities.	1904	1905	1906	1907	1908	1909	Per cent 1909.	1910	Average 1906–10	Percentage 1906–10
1. Piece goods, apparel, &c.	9·71	10·32	11·07	11·62	10·53	12·58	19·6			
2. Grain, flour, meals, &c.	7·08	7·31	6·45	7·02	7·26	8·27	12·9			
3. Feeding stuffs	4·07	3·75	4·16	5·16	4·42	5·01	7·8			
4. Tea, coffee, cocoa, sugar, &c.	3·15	3·01	2·99	3·15	3·29	3·51	5·5			
5. Machinery, implements, motors, ships, &c.	3·03	3·36	3·43	3·85	3·33	3·36	5·3			
6. Metals and metal castings, &c.	2·55	3·11	3·15	3·30	2·95	2·97	4·6			
7. Dead meat, including bacon, hams, game, &c.	1·98	2·34	2·78	2·72	2·72	2·65	4·1			
8. Coal, coke, &c.	2·66	2·26	2·39	2·86	2·86	2·60	4·1			
9. Yarns, thread, rope, cordage, &c.	1·81	1·81	1·87	1·72	1·74	2·27	3·5			
10. Boots, shoes, saddlery, indiarubber goods	1·72	1·84	2·06	2·10	2·18	2·19	3·4			
11. Textile raw materials, exclusive of flax	2·20	1·89	1·48	2·06	2·19	1·91	3·0			
12. Flax	1·55	1·78	1·71	1·91	1·38	1·91	3·0			
13. Wood, hewn and sawn	1·35	1·16	1·46	1·35	1·19	1·36	2·1			
Gross total	54 21	55·76	57·44	61·58	59·01	63·95	100			

TABLE SHOWING PRINCIPAL EXPORTS FROM IRELAND IN THE YEARS 1904 TO 1909.

Values in million £.

Commodities	1904	1905	1906	1907	1908	1909	Per cent. in 1909	1910	Average 1906–10	Percentage 1906–10
1. Piece goods, apparel, drapery, &c.	9·94	10·27	12·14	13·12	11·53	15·28	24·8			
2. Live stock	13·66	12·88	13·45	14·87	14·94	14·87	24·1			
3. Dead meat, including bacon, hams, game, &c.	2·75	2·83	3·03	3·32	3·46	3·80	6·1			
4. Wines, spirits, porter, ale, mineral waters, &c.	4·22	3·94	4·06	4·29	4·18	3·66	5·9			
5. Butter	3·66	4·05	4·28	4·01	4·03	3·68	5·9			
6. Machinery, implements, motors, ships, &c.	2·13	3·29	3·74	3·28	3·75	2·98	4·8			
7. Eggs	2·04	2·39	2·60	2·78	2·73	2·86	4·6			
8. Yarns, thread, rope, cordage, &c.	2·05	2·03	2·28	2·66	2·03	2·16	3·5			
9. Hides, skins, wool, hair, feathers, &c.	0·96	1·12	1·25	1·20	0·94	1·41	2·3			
10. Textile raw materials, exclusive of flax	1·48	1·16	0·88	1·42	1·61	1·40	2·3			
11. Grain, flour, meals, &c.	0·55	0·61	0·69	0·80	0·72	0·84	1·4			
12. Fats	0·40	0·40	0·43	0·48	0·49	0·63	1·0			
13. Feeding stuffs	0·30	0·26	0·40	0·42	0·48	0·46	0·7			
Gross total	50·45	51·97	56·62	59·82	58·01	61·73	100			

NOTES FROM REPORT *re* EXPORT OF EGGS AND BUTTER.

P. xvii. It is estimated that about 1,120,000 parcels (sent through the post) are of butter, eggs, and poultry, and that the average weight of all inland parcels is 2 lbs. 10 ozs. Assuming the export of butter, eggs, and poultry . . . to have an average weight per parcel of 3 lbs., the export . . . would amount to 30,000 cwts.

P. xviii. As in the case of eggs, these figures do not include quantities sent by parcel post. There is also a difficulty in obtaining a record of small consignments of butter under 28 lbs., as these are frequently entered in the returns as 'parcels' or 'sundries.' And as there is reason to believe that this class of trade is on the increase, the fact may to some extent account for the apparent shrinkage in exports.

FRANCE.—SPECIAL IMPORTS.

A. Principal Articles	Average Value in Millions Sterling 1861–5	1866–70	1871–5	1876–80	1881–5	1886–90	Percentages 1861–5	1866–70	1871–5	1876–80	1881–5	1886–90
1. Grain and flour	5·13	7·58	10·45	21·22	16·91	13·25	5·2	6·2	7·3	12·3	8·6	7·8
2. Wine (from 1873)	—	—	0·96	4·38	14·30	17·06	—	—	0·6	2·5	7·8	10·1
3. Raw wool	8·12	8·82	12·58	12·69	12·36	14·33	8·3	7·2	8·8	7·3	6·7	8·5
4. Silk	10·58	14·27	14·77	13·83	11·96	10·33	10·8	11·7	10·4	8·0	6·5	6·1
5. Common timber	5·39	6·98	5·72	9·00	8·08	6·38	5·5	5·7	4·0	5·2	4·4	3·8
6. Raw cotton	10·42	12·02	8·94	8·32	7·93	7·45	10·6	9·9	6·3	4·8	4·3	4·4
7. Hides and skins	3·66	4·78	6·36	6·54	7·10	6·83	3·7	3·9	4·4	3·8	3·8	4·0
8. Oil-seeds[1]	2·08	2·31	3·05	3·92	6·69	6·34	2·1	1·9	2·1	2·2	3·6	3·8
9. Coal and coke	4·31	5·13	6·83	6·33	6·72	6·83	4·4	4·2	4·8	3·6	3·6	4·0
10. Animals (except horses)	2·98	4·63	5·72	7·59	6·34	3·40	3·0	3·8	4·0	4·4	3·4	2·0
11. Wool manufactures (from 1873)	—	—	2·72	2·90	3·34	2·68	—	—	1·9	1·7	1·8	1·6
12. Machinery (from 1873)	—	—	1·15	1·56	2·80	1·71	—	—	0·8	0·9	1·5	1·0
13. Vegetable oil (from 1873)	—	—	1·81	2·26	2·34	1·80	—	—	1·2	1·3	1·2	1·1
Average total value	97·9	121·2	141·9	171·7	183·4	168·8						

B. Principal Countries of Origin	Percentage of Total Value 1861–5	1866–70	1871–5	1876–80	1881–5	1886–90	Principal Articles in 1887
1. United Kingdom	22·26	18·82	18·66	14·29	14·28	12·77	Wool, woollens, coal, cottons
2. Belgium	10·95	10·81	12·62	9·76	10·14	10·56	Wool, coal, flax, animals
3. Germany	6·22	7·15	8·42	9·46	9·59	7·96	Animals, timber, cottons
4. Italy	8·50	9·53	9·99	8·67	8·09	4·99	Wine, raw and thrown silk, olive oil
5. United States	5·37	5·85	5·78	11·44	7·85	7·06	Cotton, grain, fats, petroleum
6. Spain	2·38	2·77	3·35	4·10	7·72	8·73	Wine, fruit, lead
7. British India	3·49	3·45	2·79	3·29	4·85	4·55	Oil-seeds, cotton, wheat, indigo, coffee
8. Russia	3·73	4·14	4·91	6·45	4·74	4·75	Grain, flax, wood, wool, oil-seeds
9. Argentine Republic	1·75	2·86	2·60	2·96	3·83	4·88	Wool, hides, grain, oil-seeds
10. French Possessions	5·42	4·31	5·22	4·39	3·66	6·98	

[1] Includes oleaginous fruit from 1881.

FRANCE.—SPECIAL EXPORTS.

A. Principal Articles	Average Value in Millions Sterling 1861–5	1866–70	1871–5	1876–80	1881–5	1886–90	Percentages 1861–5	1866–70	1871–5	1876–80	1881–5	1886–90
1. Wool manufactures	10·89	10·10	12·66	13·07	14·37	14·20	10·2	8·6	8·7	9·6	10·6	10·3
2. Silk manufactures	15·23	18·20	17·53	10·15	10·35	9·68	14·2	15·5	12·1	7·5	7·6	7·0
3. Wine	9·04	9·76	10·13	9·09	9·83	10·05	8·4	8·3	7·0	6·7	7·2	7·3
4. Silk, raw and waste	3·42	5·63	4·57	5·89	6·60	5·36	3·2	4·8	3·1	4·3	4·9	3·9
5. Leather wares	3·04	3·19	5·53	6·24	5·86	5·41	2·8	2·7	3·8	4·6	4·3	3·9
6. Haberdashery[1]	6·34	6·89	6·88	7·05	5·42	5·45	5·9	5·8	4·7	5·2	4·0	4·0
7. Hides, tanned or curried	1·96	2·85	3·79	3·46	4·19	4·02	1·8	2·4	2·6	2·5	3·1	2·9
8. Cheese and butter	1·72	2·73	3·03	3·69	4·23	3·96	1·6	2·3	2·1	2·7	3·1	2·9
9. Wool, raw	1·58	1·78	3·85	3·93	3·86	5·39	1·4	1·4	2·6	2·9	2·8	3·9
10. Cotton manufactures	3·16	2·63	2·85	2·61	3·75	4·46	2·9	2·2	1·9	1·9	2·7	3·2
11. Metal wares	1·66	1·40	3·22	2·65	2·74	3·04	1·5	1·2	2·2	1·9	2·0	2·2
12. Sugar, refined	2·66	2·95	4·82	4·63	2·72	2·26	2·5	2·5	3·3	3·4	2·0	1·6
13. Sugar, raw (from 1863)	0·36	0·82	2·43	1·01	0·71	1·14	0·3	0·7	1·6	0·7	0·5	0·8
Average total value	106·6	117·4	144·0	135·1	135·3	137·6						

B. Principal Destinations	Percentages of Total Value 1861–5	1866–70	1871–5	1876–80	1881–5	1886–90	Principal Articles in 1887
1. United Kingdom	29·30	29·70	26·24	28·09	26·23	26·52	Woollens, silks, butter, wine, brandy
2. Belgium	8·08	8·90	13·39	13·00	13·45	14·59	Wool, woollens and woollen yarn, wine
3. Germany	7·84	6·53	10·63	11·10	9·91	9·33	Wine, cotton, hides and skins, fancy wares
4. United States	3·65	6·09	8·32	7·47	9·24	8·20	Silks, woollens, articles in leather
5. Switzerland	6·92	7·95	8·06	7·17	6·67	6·45	Raw silk, woollens, wine
6. French Possessions	7·12	5·02	4·86	5·26	5·63	6·49	
7. Italy	8·89	6·45	5·75	5·52	5·53	4·64	Silk and silk waste woollens
8. Spain	5·94	3·33	3·35	4·34	4·80	4·89	Woollens, animals

[1] Including small fancy wares and toys from 1877.

GERMAN EMPIRE.—SPECIAL IMPORTS.

A. Principal Articles	Average Value in Millions Sterling				Percentages			
	1872-5	'76-80	1881-5	'86-90	1872-5	'76-80	1881-5	'86-90
1. Grain and flour	19·92	29·31	18·81	15·04	10·9	16·5	12·1	8·6
2. Wool, raw	9·78	11·05	9·87	12·05	5·3	6·2	6·3	6·9
3. Cotton, raw	10·76	9·40	9·48	11·84	5·9	5·3	6·1	6·8
4. Cotton and woollen yarns	—	6·34	6·99	7·72	—	3·6	4·5	4·4
5. Animals (excluding horses)	5·70	7·19	6·28	4·79	3·1	4·0	4·0	2·7
6. Coffee	8·39	8·73	6·22	8·97	4·6	4·9	4·0	5·1
7. Silk, raw, and cocoons	5·02	5·58	6·23	7·71	2·7	3·1	4·0	4·4
8. Hides, raw	4·82	4·07	4·77	4·44	2·6	2·3	3·0	2·5
9. Petroleum	3·09	3·70	3·02	3·68	1·7	2·1	1·9	2·1
10. Horses	2·38	2·83	2·92	3·67	1·2	1·6	1·8	2·1
11. Tobacco, leaf and manufactured	4·19	4·01	2·79	3·82	2·3	2·2	1·8	2·2
12. Flax	2·15	2·15	2·17	1·86	1·1	1·2	1·4	1·1
13. Coal	—	1·30	1·14	2·30	—	0·7	0·7	1·3
Average total value	181·5	176·8	155·6	174·8				

SPECIAL EXPORTS.

A. Principal Articles	Average Value in Millions Sterling				Percentages			
	1872-5	1876-80	1881-5	1886-90	1872-5	'76-80	1881-5	'86-90
1. Woollen manufactures (from 1880)	—	8·55	8·88	9·31	—	6·1	5·7	5·9
2. Sugar, total	0 58	3·33	8·50	8·60	0·5	2·3	5·5	5·4
2. *Sugar, raw, from* 1874	*0·36*	*2·46*	*6·65*	*5·63*	*0·3*	*1·7*	*4·3*	*3·6*
2. *Sugar, refined, from* '74	*0·22*	*0·87*	*1·85*	*2·97*	*0·2*	*0·6*	*1·2*	*1·9*
3. Silk manufactures	2·97	4·63	8·45	9·42	2·4	3·3	5·4	6·0
4. Animals (excluding horses)	4·34	6·21	6·05	2·80	3·6	4·4	3·9	1·8
5. Iron, pig and unwrought ('72 and '73, '80)	2·17	3·21	5·45	—	1·8	2·3	3·5	—
6. Leather wares (excluding gloves)	1·78	2·55	4·67	5·64	1·5	1·8	3·0	3·6
7. Grain, flour, potatoes, &c.	12·15	12·19	4·26	2·67	10·2	8·8	2·7	1·7
8. Cotton manufactures (from 1880)	—	2·73	3·65	7·34	—	1·9	2·4	4·6
9. Coal ('72 and '73, '80)	4·71	2·35	3·12	4·89	3·9	1·7	2·0	3·1
10. Machinery (including locomotives)	1·28	1·92	2·80	2·84	1·0	1·4	1·8	1·8
11. Cotton and woollen yarns	—	2·93	2·95	3·03	—	2·1	1·9	1·9
12. Paper (from 1880)	—	1·61	2·12	3·14	—	1·1	1·4	2·0
Average total value	119·2	138·7	155·0	158·2				

SWITZERLAND.—SPECIAL COMMERCE, 1886.

Commodities	Imports (Per cent. of Total Value)	Exports (Per cent. of Total Value)	Countries	Imports (Per cent. of Total Value[3])	Exports (Per cent. of Total Value[3])
Articles of food and enjoyment[1]	21·3	11·1	Germany	32·8	23·9
Raw silk and silk manufactures	18·9	28·6	France	23·6	21·0
Cotton and cottons	7·6	24·1	Italy	14·9	8·9
Wool and woollens	7·0	2·0	Austria-Hungary	10·1	5·5
Animals	6·4	2·9	United Kingdom	6·2	15·3
Precious metals	5·1	4·5	Belgium	3·3	1·7
Minerals, not metals	3·6	0·4	United States and British North America	2·5	12·5
Leather and leather wares	3·1	1·3	Russian Empire	2·4	1·5
Iron and iron wares	3·0	0·6	Egypt	1·4	0·3
Watches and parts of watches	0·6	12·4			

Total value[2]: Imports, £31·09; Exports, £26·55, in millions sterling.

[1] Including coffee, tobacco, &c. [2] 1886. [3] Average of 1885 and 1886.

GREECE.—SPECIAL COMMERCE, 1887.

Imports: Commodities	Per cent. of Total	Imports: Countries	Per cent. of Total	Exports: Commodities	Per cent. of Total	Exports: Countries	Per cent. of Total
Cereals (exclusive of rice)	38·1	Russia	26·02	Currants	53·0	United Kingdom	40·7
Cotton manufactures	8·6	United Kingdom	23·8	Ores	17·2	France	21·9
Building wood	4·7	Austria-Hungary	13·2	Wines	4·9	Belgium	9·8
Minerals	4·7	Turkey	12·8	Lead	4·2	Austria-Hungary	6·6
Woollen manufactures	3·8	France	7·9	Olive Oil	3·4	United States	4·3
Sugar	2·6	Roumania	6·2	Tobacco	2·2	Germany	4·0
Coffee	2·3	Italy	4·6	Figs	2·0	Turkey	3·7

Total value: Imports, £5·27; Exports, £4·10, in millions sterling.

BELGIUM.—SPECIAL[1] IMPORTS.

A. Principal Articles	Average Value in Millions Sterling					Percentages				
	1861–5	1866–70	1871–5	1876–80	1881–5	1861–5	1866–70	1871–5	1876–80	1881–5
1. Grain, all kinds	2·61	3·39	8·03	11·71	11·42	10·2	10·0	15·2	19·3	18·8
2. Wool	2·47	3·59	5·21	6·29	4·30	9·6	10·6	9·9	10·4	7·1
3. Vegetable fibres (flax, hemp, &c.)	1·75	2·38	2·60	3·17	3·46	6·8	7·1	4·9	5·2	5·7
4. Hides, raw	1·18	1·69	2·96	1·80	2·59	4·6	5·0	5·6	3·0	4·3
5. Animals (excluding horses)	0·80	0·87	1·67	2·26	2·24	3·1	2·6	3·2	3·7	3·7
6. Oil-seeds	1·05	1·00	1·20	1·34	1·97	4·1	2·9	2·3	2·2	3·2
7. Wood for building	0·73	0·78	1·67	1·76	1·94	2·8	2·3	3·2	2·9	3·2
8. Metals and minerals (excluding iron, copper, tin, coal)	0·54	1·12	1·56	1·95	1·85	2·1	3·3	3·0	3·2	3·0
9. Resins, petroleum, &c.	0·85	1·43	1·71	1·65	1·69	3·3	4·2	3·2	2·7	2·8
10. Coffee	1·35	1·28	1·87	1·99	1·43	5·3	3·8	3·5	3·3	2·3
11. Raw cotton	1·25	1·64	1·84	1·35	1·36	4·9	4·8	3·5	2·2	2·2
Average total value	25·5	33·7	52·6	60·4	60·5					

B. Principal Countries of Origin	Percentages					Principal Articles
	1861–5	1866–70	1871–5	1876–80	1881–5	
1. France	24·06	25·17	24·03	22·15	19·78	1. Wine, flax and hemp, cotton, hides and skins
2. Holland	18·07	13·82	13·00	13·33	14·25	2. Animals, coffee, hemp and flax, grain
3. Germany (including Hanse towns from 1876)	10·54	11·51	12·94	14·72	14·11	3. Animals, iron ores and pig iron, coal
4. United Kingdom	17·21	17·03	17·94	14·70	13·09	4. Wool, chemical products
5. United States	3·84	4·55	7·57	12·04	11·22	5. Grain, petroleum, animal fats
6. Russia	4·72	5·09	5·66	7·92	8·03	6. Grain, flax and hemp, oil-seeds

[1] Under the head of special commerce in Belgium are included all goods that pay customs duty.

BELGIUM.—SPECIAL[1] EXPORTS.

A. Principal Articles	Average Value in Millions Sterling					Percentages				
	1861–5	1866–70	1871–5	1876–80	1881–5	1861–5	1866–70	1871–5	1876–80	1881–5
1. Grain, all kinds (from 1863)	0·20	0·35	1·84	4·09	4·22	0·9	1·3	4·3	9·0	8·1
2. Coal and coke	2·20	2·77	4·14	2·93	3·17	10·2	10·5	9·7	6·4	6·1
3. Flax	1·54	1·79	3·29	2·75	2·62	7·2	6·8	7·7	6·0	5·0
4. Linen and hemp yarn	0·76	1·19	1·56	1·92	2·59	3·5	4·5	3·6	4·2	4·9
5. Machinery	0·73	0·73	1·66	1·87	2·42	3·4	2·7	3·9	4·1	4·6
6. Woollen yarn	0·59	0·98	2·23	2·38	2·17	2·7	3·7	5·2	5·2	4·1
7. Glass and glass wares	0·51	0·62	1·12	1·67	2·09	2·3	2·4	2·6	3·6	4·0
8. Hides, raw	0·99	1·24	2·06	1·32	1·89	4·6	4·7	4·8	2·9	3·6
9. Iron, wrought, wire, rails, &c.	0·69	1·20	2·03	1·95	1·65	3·2	4·5	4·7	4·3	3·1
10. Zinc, unwrought	0·49	0·73	0·86	1·07	1·37	2·3	2·8	2·0	2·3	2·6
11. Raw sugar	0·26	0·73	1·61	1·26	1·26	1·2	2·7	3·7	2·7	2·4
Average total value	21·5	26·2	42·5	45·3	52·1					

B. Principal Destinations	Percentages					Principal Articles
	1861–5	1866 70	1871–5	1876–80	1881–5	
1. France	37·09	38·51	31·70	30·19	30·81	1. Coal and coke, stone, flax and hemp, animals
2. United Kingdom	19·77	19·72	20·77	20·23	19·66	2. Flax, woollen yarns, glass and glass wares
3. Germany (including Hanse towns from 1876)	11·79	14·66	21·19	20·64	17·84	3. Grain, hides, petroleum
4. Holland	12·98	11·80	12·46	13·84	13·21	4. Stone, grain, yarns

[1] Under the head of special commerce in Belgium are included all goods that pay customs duty.

NORWAY.—GENERAL IMPORTS.

A. Principal Articles	Average Value in Millions Sterling			Percentages		
	1872-5	1876-80	1881-5	1872-5	1876-80	1881-5
1. Rye and rye meal	1·25	1·36	1·27	14·6	15·7	14·5
2. Woollen manufactures	0·66	0·51	0·62	7·8	5·9	7·1
3. Coal	0·34	0·32	0·39	4·0	3·7	4·5
4. Coffee	0·59	0·56	0·38	6·9	6·5	4·4
5. Barley	0·37	0·36	0·32	4·4	4·2	3·6
6. Butter	0·20	0·30	0·29	2·3	3·4	3·3
7. Cotton manufactures	0·32	0·26	0·27	3·7	3·0	3·1
8. Iron wares	0·32	0·27	0·23	3·7	3·1	2·7
9. Wheat and wheat meal	0·19	0·20	0·23	2·2	2·4	2·6
10. Hides and skins	0·22	0·18	0·19	2·5	2·0	2·2
11. Iron, wrought and unwrought	0·23	0·16	0·19	2·7	1·9	2·2
Average total value	8·55	8·67	8·79			

B. From	Percentages			Principal Articles
	1874-5	1876-80	1881-5	
1. German Empire	26·65	27·58	29·03	Rye and rye meal, coffee
2. United Kingdom	29·48	26·89	26·20	Woollens, cottons, coal
3. Sweden	7·25	8·34	11·02	Iron and iron wares, butter
4. Denmark	11·16	10·81	9·19	Flour, butter
5. Russia and Finland	9·75	10·85	8·79	Rye, barley, and wheat
6. North America	1·23	1·82	3·22	

NORWAY.—GENERAL EXPORTS.

A. Principal Articles	Average Value in Millions Sterling			Percentages		
	1873-5	1876-80	1881-5	1873-5	1876-80	1881-5
1. Wood	2·70	1·96	1·99	46·1	35·4	31·3
2. Cod, dried or split	0·94	1·08	1·15	16·0	19·5	18·1
3. Herrings	0·93	0·71	0·65	15·9	12·9	10·2
4. Train oil	0·31	0·30	0·29	5·3	5·5	4·5
5. Lucifer matches	0·02	0·06	0·09	0·3	1·2	1·4
6. Salted fish (other than cod and herrings), sprats, and lobsters	0·07	0·09	0·09	1·2	1·7	1·4
Average total value	5·86	5·54	6·38			

NORWAY.—GENERAL EXPORTS.

B. To	Percentages 1874–5	1876–80	1881–5	Principal Articles
1. United Kingdom .	29·84	31·69	33·25	Wood, herrings
2. German Empire .	16·64	16·29	13·35	Train oil, fish
3. Sweden . .	12·15	11·29	12·04	Salted fish
4. Spain . . .	7·92	9·55	10·29	Dried cod
5. France . .	8·21	7·94	7·77	Wood

SWEDEN. — GENERAL IMPORTS
(INCLUDING BULLION AND SPECIE).

A. Principal Articles	Average Value in Millions Sterling			Percentages		
	1873–5	1876–80	1881–4	1873–5	1876–80	1881–4
1. Woollen manufactures .	0·98	0·94	1·20	7·4	6·5	7·1
2. Rye and rye meal . .	0·99	1·01	1·12	7·5	7·0	6·6
3. Coal, coke, &c. . .	0·81	0·70	0·85	6·1	4·8	5·0
4. Coffee	0·98	0·87	0·65	7·4	6·0	3·8
5. Cotton, raw . . .	0·54	0·49	0·65	4·1	3·3	3·8
6. Sugar, raw . . .	0·56	0·52	0·61	4·2	3·6	3·6
Average total value	13·2	14·44	17·00			

B. From	Percentages of Total Value 1873–5	1876–80	1881–4	Principal Articles
1. Germany . .	21·26	22·00	27·29	Coffee, spirits, tobacco
2. United Kingdom .	32·82	28·76	26·21	Coal, cotton, woollen and cotton fabrics
3. Denmark . .	16·51	18·31	17·09	Wheat and wheat-flour
4. Russia and Finland	8·89	10·20	9·24	Rye and Rye-meal, butter
5. Norway . . .	5·15	5·29	6·31	Salted fish

SWEDEN. — GENERAL EXPORTS (INCLUDING BULLION AND SPECIE).

A. Principal Articles	Average Value in Millions Sterling			Percentages		
	1872–5	1876–80	1881–4	1872–5	1876–80	1881–4
1. Wood	5·28	4·90	5·41	47·2	42·3	40·1
2. Iron (pig, bar and blooms)	1·82	1·22	1·40	16·3	10·5	10·3
3. Oats	1·64	1·73	1·29	14·6	14·9	9·5
4. Butter	0·35	0·47	0·77	3·1	4·1	5·7
5. Iron (bolt, hoop, &c.)	0·34	0·35	0·57	3·0	3·0	4·2
6. Lucifer matches	0·24	0·32	0·44	2·1	2·8	3·3
7. Animals (cattle, sheep and swine: cattle and swine only for period 1881–4)	0·39	0·33	0·41	3·5	2·8	3·1
8. Paper	0·14	0·27	0·42	1·2	2·4	3·1
9. Barley	0·25	0·26	0·20	2·2	2·3	1·5
10. Steel	—	0·15	0·19	—	1·3	1·4
Average total value	11·18	11·59	13·48			

B. To	Percentages of Total Value			Principal Articles
	1872–5	1876–80	1881–4	
1. United Kingdom	53·94	51·98	48·91	Wood, rod, and other iron
2. France	9·62	12·65	12·58	Wood, rod, and other iron
3. Denmark	11·82	10·61	11·52	Butter, wood
4. Germany	6·87	6·86	7·78	Iron, wood, matches
5. Norway	3·32	3·35	4·00	Buttons

DENMARK.—GENERAL IMPORTS.

A. Principal Articles	Average Value of Gross Imports in Millions Sterling		Percentages of Total Value		Average Value of Excess of Imports over Exports	
	1874–8	1878–82	1874–8	1878–82	1874–8	1878–82
1. Woollen manufactures	0·93	0·96	7·58	7·38	0·81	0·80
2. Cotton, linen, and hemp manufactures	0·80	0·78	6·54	6·00	0·73	0·70
3. Iron and steel wares	0·83	0·77	6·79	5·92	0·73	0·68
4. Sugar, refined and unrefined	0·68	0·70	5·54	5·38	0·57	0·60
5. Timber and firewood	0·84	0·61	6·87	4·70	0·83	0·60
6. Coal	0·65	0·63	5·30	4·80	0·58	0·57
7. Raw coffee	0·68	0·54	5·54	4·16	0·36	0·38
Average total value	12·27	13·0				

DENMARK.—GENERAL IMPORTS.

B. From	Percentages of Total Value		
	1874–5	1876–80	1881–4
German Empire	36·23	37·51	36·71
United Kingdom	26·39	23·73	23·16
Sweden	11·31	11·01	12·95
United States	1·43	4·55	5·98
Russia	3·69	4·58	4·46

GENERAL EXPORTS.

A. Principal Articles	Average Value of Gross Exports in Millions Sterling		Percentages of Total Value		Average Value of Excess of Exports over Imports	
	1874–8	1878–82	1874–8	1878–82	1874–8	1878–82
1. Swine	0·88	1·12	9·33	10·97	0·85	1·08
2. Butter	1·66	1·33	17·60	13·03	1·41	1·05
3. Horned cattle	1·26	1·17	13·36	11·46	1·07	1·03
4. Barley	0·85	0·94	9·01	9·20	0·80	0·91
5. Wheat meal and flour	0·71	0·66	7·53	6·46	0·70	0·65
6. Horses and foals	0·36	0·54	3·82	5·29	0·28	0·47
Average total value	9·43	10·21				

B. To	Percentages of Total Value		
	1874–5	1876–80	1881–4
United Kingdom	40·82	40·15	38·36
German Empire	30·95	32·21	31·87
Sweden	13·38	14·08	14·86
Norway	9·25	7·42	6·86
United States	·14	·23	1·68

PORTUGAL.—SPECIAL IMPORTS
(INCLUDING BULLION AND SPECIE).

A. Principal Articles	Average Value in Millions Sterling			Percentages		
	1873–5	1876–80	1881–5	1873–5	1876–80	1881–5
1. Wheat	0·40	0·78	0·95	5·4	10·3	11·6
2. Cotton manufactures	0·76	0·63	0·63	10·3	8·4	7·7
3. Sugar, raw	0·43	0·44	0·41	5·8	5·8	5·1
4. Woollen manufactures	0·38	0·29	0·34	5·2	3·8	4·1
Average total value	7·38	7·55	8·15			

PORTUGAL.—SPECIAL IMPORTS.

B. From	Percentages 1873–5	1876–80	1881–2
1. United Kingdom	51·36	44·27	41·47
2. United States	4·60	10·64	15·11
3. France	14·65	14·16	11·54
4. Germany	2·45	3·81	7·07

PORTUGAL. — SPECIAL EXPORTS (INCLUDING BULLION AND SPECIE).

A. Principal Articles	Average Value in Millions Sterling			Percentages		
	1873–5	1876–80	1881–5	1873–5	1876–80	1881–5
1. Wine	2·21	2·06	2·54	41·4	40·7	48·7
2. Cork	0·26	0·33	0·55	4·9	6·5	10·5
3. Animals (excluding horses and mules)	0·36	0·35	0·46	6·8	6·9	8·7
Average total value	5·33	5·07	5·22			

B. To	Percentages 1873–5	1876–80	1881–2
1. United Kingdom	55·70	50·26	45·51
2. Brazil	11·26	20·95	20·81
3. France	4·65	7·02	11·66
4. Spain	6·41	6·26	6·71

SPAIN.—GENERAL IMPORTS.

A. Principal Articles	Average Value in Millions Sterling		Percentages		Principal Countries of Origin
	1876–80	1881–5	1876–80	1881–5	
1. Raw cotton	2·76	3·03	12·6	10·1	U.S., Eg., Tur.
2. Brandy and spirits	0·79	1·85	3·6	6·2	Ger.
3. Wheat	0·59	1·49	2·7	5·0	Rus.
4. Timber and building materials	0·93	1·37	4·3	4·6	Swe.
5. Woollen manufactures	0·88	1·14	4·0	3·8	Fr.
6. Sugar	1·00	1·15	4·6	3·8	Sp. W.I., Ger., Ph. I.
7. Machinery	0·67	1·12	3·0	3·7	U.K., Fr., Bel.
8. Tobacco	0·95	1·08	4·3	3·6	U.S., Ph. I.
9. Codfish	0·66	1·03	3·0	3·4	Nor., B.N.A.
10. Coal and coke	0·78	0·99	3·5	3·3	U.K.
11. Iron, wrought and unwrought	0·56	0·82	2·5	2·7	U.K.
12. Linen and hemp yarn	0·88	0·73	4·0	2·4	U.K.
Average total value	21·81	29·86			

SPAIN.—GENERAL IMPORTS.

B. From	Percentages of Total Value		
	1873–5	1876–80	1881–4
1. France	23·47	31·14	27·21
2. United Kingdom	35·28	24·74	20·90
3. United States	10·68	12·78	11·62
4. Germany	·83	3·57	9·91
5. Spanish W.I., and Philippine Islands	9·37	7·86	6·53
6. Belgium	2·11	3·62	4·35
7. Sweden and Norway	2·85	2·81	3·08

GENERAL EXPORTS.

A. Principal Articles	Average Value in Millions Sterling		Percentages		Principal Destinations
	1876–80	1881–5	76–80	1881–5	
1. Wine	6·55	12·02	31·5	43·6	Fr., U.K., Sp. W.I.
2. Lead in blocks, bars, &c.	2·12	1·78	10·2	6·4	U.K., Fr.
3. Iron ore	0·73	1·70	3·5	6·2	U.K., Fr., Hol., Bel., U.S.
4. Copper ore	1·42	1·03	6·8	3·7	U.K.
5. Raisins	0·99	0·87	4·7	3·1	U.S., U.K.
6. Oranges	0·42	0·77	2·0	2·8	U.K., Fr., U.S., Ger.
7. Copper regulus	0·54	0·76	2·6	2·7	U.K., Fr.
8. Cork	0·47	0·57	2·3	2·0	Port., Fr.
9. Wheat flour	0·73	0·39	3·5	1·4	Sp. W.I.
10. Esparto grass	0·31	0·33	1·5	1·2	U.K.
Average total value	20·76	27·52			

B. To	Percentages of Total Value		
	1873–5	1876–80	1881–4
1. France	20·01	26·56	40·47
2. United Kingdom	36·61	36·19	29·07
3. Spanish W.I. and Philippine Islands	15·68	15·38	11·27
4. United States	3·87	2·99	3·16
5. Argentine Republic	3·50	2·62	2·52

AUSTRIA-HUNGARY.—SPECIAL IMPORTS.

Principal Articles	Average Value[1] in Millions Sterling		Percentage of Value	
	1876–80	1881-5	1876–80	1881–5
1. Raw cotton	3·07	3·98	6·6	7·7
2. Grain	3·50	3·62	7·5	7·0
3. Raw wool (from 1879)	2·93	3·02	6·0	5·8
4. Coffee	2·61	2·37	5·5	4·6
5. Tobacco	1·92	2·11	4·1	4·1
6. Hides and skins	1·44	1·78	3·1	3·4
7. Leather and leather wares	1·64	1·59	3·5	3·0
8. Woollen manufactures	1·64	1·58	3·5	3·0
9. Cotton yarn	1·56	1·45	3·3	2·8
10. Animals (except horses)	2·29	1·39	4·9	2·7
11. Silk and floss silk	1·23	1·43	2·6	2·7
Average total value	46·86	51·52		

SPECIAL EXPORTS.

Principal Articles	Average Value[1] in Millions Sterling		Percentage of Value	
	1876–80	1881–5	1876–80	1881–5
1. Grain (from 1878)	6·50	5·78	11·6	9·5
2. Sugar and molasses	3·88	5·37	7·1	8·9
3. Wood	3·40	4·74	6·2	7·8
4. Animals (except horses)	4·24	3·60	7·8	5·9
5. Woollen manufactures	1·99	2·25	3·6	3·7
6. Flour and meal	3·12	2·22	5·7	3·7
7. Leather and leather wares	1·40	1·72	2·6	2·8
8. Glass and glass wares	1·27	1·66	2·3	2·7
9. Wool (from 1879)	1·72	1·67	3·0	2·7
10. Wooden wares (from 1877)	1·06	1·43	1·9	2·3
Average total value	54·61	60·45		

[1] In these tables the florin is converted at the rate of 12 to the pound, the rate of exchange between London and Vienna having varied within narrow limits above and below that during the two periods to which the tables relate. See p. 621, n. 4.

ROUMANIA.—GENERAL IMPORTS.

A. Principal Articles	Average Value in Millions Sterling		Percentages	
	1879–80	1881–4	1879–80	1881–4
1. Woollen tissues	0·61	1·17	6·0	9·8
2. Cotton tissues	0·94	0·81	9·2	6·8
3. Boots and shoes	0·30	0·56	3·0	4·7
4. Clothes	0·33	0·41	3·2	3·4
Average total value	10·20	12·0		

B. From	Percentages of Total Value		
	1874–5	1876–80	1881–4
1. Austria-Hungary	39·58	51·43	46·16
2. United Kingdom	25·94	17·07	19·43
3. Germany	4·98	8·85	12·46
4. France	13·97	8·86	8·85

GENERAL EXPORTS.

A. Principal Articles	Average Value in Millions Sterling		Percentages	
	1879–80	1881–4	1879–80	1881–4
1. Maize	2·30	2·66	25·1	31·0
2. Wheat	3·06	2·29	33·4	26·7
Average total value	9·15	8·56		

B. To	Percentages of Total Value		
	1874–5	1876–80	1881–4
1. United Kingdom	11·32	17·79	38·58
2. Austria-Hungary	33·68	36·44	33·72
3. France	12·18	9·75	9·64
4. Germany	0·14	0·47	1·45

ITALY.—SPECIAL IMPORTS.[1]

A. Principal Articles	Average Value in Millions Sterling 1862–5	1866–70	1871–5	1876–80	1881–5	Percentages 1862–5	1866–70	1871–5	1876–80	1881–5	Principal Countries of Origin in 1886
1. Raw cotton	0·25	1·08	2·08	2·12	3·58	0·7	3·0	4·4	4·4	6·8	1. Ind., U.S., U.K.
2. Cotton manufactures (including yarn)	—	4·24	4·37	3·49	3·25	—	11·8	9·2	7·3	6·2	2. U.K., Fr., Ger., Swit.
Cotton yarn (excluding 1866, 1867, 1868)	*0·86*	*1·20*	*1·45*	*1·25*	*1·09*	*2·4*	*3·3*	*3·0*	*2·6*	*2·1*	
Cotton tissues, from 1869	—	*3·04*	*2·92*	*2·24*	*2·16*	—	*8·5*	*6·2*	*4·7*	*4·1*	
3. Wheat	4·98	3·23	3·85	3·73	2·80	13·8	9·0	8·1	7·8	5·3	3. Rus., Ind., Tur.
4. Coal	0·67	1·02	1·64	1·83	2·62	1·8	2·5	3·4	3·8	5·0	4. U.K., Fr., A.-H., Ger.
5. Raw sugar	0·95	0·38	0·67	1·31	1·66	2·6	1·0	1·4	2·7	3·2	5. Fr., U.K., Ger., Swit.
6. Hides, raw and dried	0·81	0·73	1·38	1·22	1·56	2·2	2·0	2·9	2·5	3·0	6. U.K., Br.E.I., A.R.
7. Silk	4·02	1·80	1·86	2·73	1·43	11·1	5·0	3·9	5·7	2·7	7 Fr., A.-H.
8. Timber	0·73	1·10	0·98	1·35	1·35	2·0	3·0	2·1	2·8	2·6	8. A.-H.
9. Raw wool	0·58	0·57	0·99	1·29	1·26	1·6	1·6	2·1	2·7	2·4	9. A.R., Urug.
10. Coffee	0·78	0·88	1·17	1·16	1·11	2·1	2·4	2·5	2·4	2·1	10. U.K., Fr., Ind., Am.
11. Fish	0·60	0·67	0·87	0·83	1·10	1·6	1·8	1·8	1·7	2·1	
Average total value	36·01	35·83	47·26	47·53	52·21						

B. From	Percentages 1866–70	1871–5	1876–80	1881–5	1886–90
1. France and Algeria	28·98	28·21	27·15	26·09	19·21
2. United Kingdom	23·54	24·48	22·48	22·51	20·35
3. Austria-Hungary	15·87	18·55	17·80	15·17	12·81
4. Germany	0·95	1·96	3·94	7·11	10·28
5. Switzerland	6·27	3·69	2·67	4·30	4·80
6. Russia	3·29	3·96	5·08	3·45	3·45

Average total value 1886–90, 58·08*l.* millions.

ITALY.—SPECIAL[1] EXPORTS.[2]

A. Principal Articles	Average Value in Millions Sterling					Percentages					Principal Destinations
	1862–5	1866–70	1871–5	1876–80	1881–5	1862–5	1866–70	1871–5	1876–80	1881–5	
1. Silk, total	—	8·84	13·49	10·88	11·43	—	30·0	31·4	25·5	25·9	
Silk, raw and thrown	*7·41*	*7·93*	*12·07*	*9·94*	*10·34*	*32·8*	*26·9*	*28·1*	*23·3*	*23·5*	1. Fr., Swit., Ger.
Silk, waste, from 1869	—	*0·91*	*1·42*	*0·94*	*1·09*	—	*3·1*	*3·3*	*2·2*	*2·4*	
2. Olive oil	2·69	3·53	4·35	4·29	3·30	11·9	12·0	10·1	10·1	7·5	2. Fr., U.K., Rus.
3. Wine in casks	0·58	0·47	0·70	1·10	2·53	2·5	1·6	1·6	2·6	5·7	3. Fr., Swit.
4. Fruit, oranges, &c.	1·64	1·42	1·37	1·54	1·73	7·2	4·8	3·2	3·6	3·9	4. U.S., U.K., Fr.
5. Eggs	0·07	0·15	0·24	1·10	1·34	0·3	0·5	0·5	2·6	3·0	5. Fr., Ger., A.-H.
6. Animals	0·36	0·94	1·49	1·70	1·22	1·6	3·2	3·4	4·0	2·7	6. Fr, A.-H., Ger.
7. Sulphur	1·19	1·15	1·10	1·09	1·17	5·3	3·9	2·5	2·5	2·6	7. U.S., Fr., U.K., Ger.
8. Rice, from 1869	—	1·34	0·97	1·02	1·10	—	4·5	2·2	2·4	2·5	8. Fr., A.-H., Tur.
9. Hemp and flax	0·51	0·86	1·21	1·16	1·08	2·2	2·9	2·8	2·7	2·4	9. Fr., U.K., A.-H.
10. Raw cotton	0·18	0·18	0·68	0·49	1·03	0·8	0·6	1·5	1·1	2·3	10. Ger., A.H., Swit.
Average total value	22·55	29·42	42·95	42·53	44·05						

B. To	Percentages					B. To	Percentages				
	1866–70	1871–5	1876–80	1881–5	1886–90		1866–70	1871–5	1876–80	1881–5	1886–90
1. France & Algeria.	34·37	38·06	44·62	42·82	31·35	4. Germany	0·32	1·32	2·93	7·68	10·26
2. Austria-Hungary.	15·27	19·30	16·29	11·21	9·26	5. United Kingdom	13·26	12·21	9·80	7·46	9·72
3. Switzerland.	15·71	13·13	11·21	11·12	16·13	6. United States, Canada	3·81	2·71	3·68	4·81	6·52

[1] Under the head of special commerce in Italy are included all articles that have paid customs duty.
[2] Average total value 1886–90, 40·97*l.* millions.

RUSSIA IN EUROPE.—IMPORTS.

Principal Articles	Average Value[1] in Millions Sterling					Percentages (calculated on Rouble Values)				
	1861–5	1866–70	1871–5	1876–80	1881–5	1861–5	1866–70	1871–5	1876–80	1881–5
1. Raw cotton	2·04	4·51	6·47	5·42	7·94	11·0	13·7	11·3	10·5	16·5
2. Tea (from 1862)	1·36	1·87	4·31	4·22	4·51	7·2	5·7	7·5	8·0	9·4
3. Metal wares (till 1882)[2]	0·75	2·48	3·35	2·43	2·76	4·0	7·6	5·8	4·6	5·4
4. Raw wool	0·54	1·22	2·12	2·17	2·33	2·9	3·7	3·7	4·2	4·8
5. Chemicals and drugs	0·25	0·41	1·23	1·52	1·79	1·3	1·2	2·1	3·0	3·7
6. Engines and machinery	1·01	2·05	2·69	3·37	1·70	5·3	6·2	4·7	6·5	3·5
7. Coal and coke	0·40	0·53	1·35	1·56	1·61	2·1	1·6	2·3	3·0	3·3
8. Oil, other than mineral	0·85	1·10	1·81	1·36	1·40	4·5	3·3	3·1	2·6	2·9
9. Wine and champagne (excluding 1864)	1·05	0·88	1·77	1·29	1·39	5·4	2·7	3·1	2·4	2·9
10. Cotton yarn	0·36	0·62	1·71	1·92	1·14	1·9	1·9	3·0	3·7	2·3
11. Fruit and vegetables	0·67	0·78	1·36	1·06	1·14	3·5	2·4	2·4	2·0	2·3
12. Raw silk	0·33	0·63	1·03	1·02	0·99	1·7	1·9	1·8	1·9	2·0
13. Iron and steel rails (from 1873)	—	—	2·51[3]	1·91	0·07	—	—	4·1[3]	3·6	0·2
Quinquennial average totals	18·86	32·65	57·00	52·00	48·00					

	Percentages		
	1872–5	1876–80	1881–5
1. German Empire	41·62	47·64	38·47
2. United Kingdom	28·70	27·15	24·37
3. Austria	5·07	4·70	5·05
4. France	5·45	3·70	3·97
5. Turkey	3·47	2·81	3·39

[1] Rate of conversion of rouble (paper):—

Year	1861	1862	1863	1864	1865	1866	1867	1868	1869	1870	1871	1872	1873	1874
Roubles to £	7·17	6·98	6·60	7·53	7·70	8·27	7·44	7·47	7·91	8·15	7·54	7·41	7·49	7·28
Year	1875	1876	1877	1878	1879	1880	1881	1882	1883	1884	1885	1886	1887	1888
Roubles to £	7·30	7·77	9·31	9·87	9·96	9·61	9·56	9·97	10·18	9·96	9·79	10·21	10·90	10·52

[2] Exclusive of wrought-iron and rails.

[3] For 1873-75.

RUSSIA IN EUROPE.—EXPORTS.

Principal Articles	Average Value in Millions Sterling					Percentages (calculated on Rouble Values)				
	1861–5	1866–70	1871–5	1876–80	1881–5	1861–5	1866–70	1871–5	1876–80	1881–5
1. Corn, wheat (excluding 1864)	5·43	8·10	12·99	14·59	14·74	24·1	26·5	26·9	26·7	26·7
„ rye „ „	1·17	1·68	5·65	8·11	5·89	5·1	5·4	11·6	14·7	10·6
„ oats „ „	0·40	1·09	2·34	3·82	4·49	1·7	3·6	4·8	6·9	8·1
„ barley „ „	0·39	0·56	1·15	1·74	2·61	1·7	1·8	2·3	3·2	4·7
„ maize „ „	0·27	0·26	0·32	0·56	1·00	1·2	0·8	0·6	1·0	1·8
Total Corn	*7·66*	*11·69*	*22·45*	*28·82*	*28·73*	*33·8*	*38·1*	*46·2*	*52·5*	*51·9*
2. Flax	2·45	4·00	6·03	5·90	6·03	11·0	13·1	12·5	10·8	10·9
3. Wood of all sorts	0·95	1·48	3·45	3·28	3·25	4·3	·4·8	7·1	5·8	5·9
4. Linseed	2·03	3·06	3·76	3·43	2·61	9·1	9·9	7·8	6·2	4·7
5. Hemp	1·25	1·22	1·63	1·62	1·59	5·6	3·9	3·3	2·9	2·9
6. Raw wool	2·24	1·32	1·33	1·53	1·38	9·9	4·3	2·7	2·7	2·5
Quinquennial average totals	22·29	30·56	48·25	54·86	55·08					

	Percentages				Percentages		
	1872–5	1876–80	1881–5		1872–5	1876–80	1881–5
1. United Kingdom	37·76	31·34	32·33	5. Austria	6·65	7·09	5·29
2. German Empire	30·34	31·84	30·82	6. Belgium	2·62	3·33	4·94
3. France	8·35	10·62	7·95	7. Italy	2·19	1·59	2·36
4. Holland	4·42	6·34	6·74	8. Turkey	2·22	2·08	1·95

RUSSIA IN EUROPE.—IMPORTS.

Principal Articles	Average Value[1] in Millions Sterling					Percentages (calculated on Rouble Values)				
	1861–5	1866–70	1871–5	1876–80	1881–5	1861–5	1866–70	1871–5	1876–80	1881–5
1. Raw cotton	2·04	4·51	6·47	5·42	7·94	11·0	13·7	11·3	10·5	16·5
2. Tea (from 1862)	1·36	1·87	4·31	4·22	4·51	7·2	5·7	7·5	8·0	9·4
3. Metal wares (till 1882)[2]	0·75	2·48	3·35	2·43	2·76	4·0	7·6	5·8	4·6	5·4
4. Raw wool	0·54	1·22	2·12	2·17	2·33	2·9	3·7	3·7	4·2	4·8
5. Chemicals and drugs	0·25	0·41	1·23	1·52	1·79	1·3	1·2	2·1	3·0	3·7
6. Engines and machinery	1·01	2·05	2·69	3·37	1·70	5·3	6·2	4·7	6·5	3·5
7. Coal and coke	0·40	0·53	1·35	1·56	1·61	2·1	1·6	2·3	3·0	3·3
8. Oil, other than mineral	0·85	1·10	1·81	1·36	1·40	4·5	3·3	3·1	2·6	2·9
9. Wine and champagne (excluding 1864)	1·05	0·88	1·77	1·29	1·39	5·4	2·7	3·1	2·4	2·9
10. Cotton yarn	0·36	0·62	1·71	1·92	1·14	1·9	1·9	3·0	3·7	2·3
11. Fruit and vegetables	0·67	0·78	1·36	1·06	1·14	3·5	2·4	2·4	2·0	2·3
12. Raw silk	0·33	0·63	1·03	1·02	0·99	1·7	1·9	1·8	1·9	2·0
13. Iron and steel rails (from 1873)	—	—	2·51[3]	1·91	0·07	—	—	4·1[3]	3·6	0·2
Quinquennial average totals	18·86	32·65	57·00	52·00	48·00					

	Percentages		
	1872-5	1876–80	1881–5
1. German Empire	41·62	47·64	38·47
2. United Kingdom	28·70	27·15	24·37
3. Austria	5·07	4·70	5·05
4. France	5·45	3·70	3·97
5. Turkey	3·47	2·81	3·39

[1] Rate of conversion of rouble (paper):—

Year	1861	1862	1863	1864	1865	1866	1867	1868	1869	1870	1871	1872	1873	1874
Roubles to £	7·17	6·98	6·60	7·53	7·70	8·27	7·44	7·47	7·91	8·15	7·54	7·41	7·49	7·28
Year	1875	1876	1877	1878	1879	1880	1881	1882	1883	1884	1885	1886	1887	1888
Roubles to £	7·30	7·77	9·31	9·87	9·96	9·61	9·56	9·97	10·18	9·96	9·79	10·21	10·90	10·52

[2] Exclusive of wrought-iron and rails.

[3] For 1873–75.

RUSSIA IN EUROPE.—EXPORTS.

Principal Articles	Average Value in Millions Sterling					Percentages (calculated on Rouble Values)				
	1861–5	1866–70	1871–5	1876–80	1881–5	1861–5	1866–70	1871–5	1876–80	1881–5
1. Corn, wheat (excluding 1864)	5·43	8·10	12·99	14·59	14·74	24·1	26·5	26·9	26·7	26·7
" rye " "	1·17	1·68	5·65	8·11	5·89	5·1	5·4	11·6	14·7	10·6
" oats " "	0·40	1·09	2·34	3·82	4·49	1·7	3·6	4·8	6·9	8·1
" barley " "	0·39	0·56	1·15	1·74	2·61	1·7	1·8	2·3	3·2	4·7
" maize " "	0·27	0·26	0·32	0·56	1·00	1·2	0·8	0·6	1·0	1·8
Total Corn	*7·66*	*11·69*	*22·45*	*28·82*	*28·73*	*33·8*	*38·1*	*46·2*	*52·5*	*51·9*
2. Flax	2·45	4·00	6·08	5·90	6·03	11·0	13·1	12·5	10·8	10·9
3. Wood of all sorts	0·95	1·48	3·45	3·28	3·25	4·3	·4·8	7·1	5·8	5·9
4. Linseed	2·03	3·06	3·76	3·43	2·61	9·1	9·9	7·8	6·2	4·7
5. Hemp	1·25	1·22	1·63	1·62	1·59	5·6	3·9	3·3	2·9	2·9
6. Raw wool	2·24	1·32	1·33	1·53	1·38	9·9	4·3	2·7	2·7	2·5
Quinquennial average totals	22·29	30·56	48·25	54·86	55·08					

	Percentages				Percentages		
	1872–5	1876–80	1881–5		1872–5	1876–80	1881–5
1. United Kingdom	37·76	31·34	32·33	5. Austria	6·65	7·09	5·29
2. German Empire	30·34	31·84	30·82	6. Belgium	2·62	3·33	4·94
3. France	8·35	10·62	7·95	7. Italy	2·19	1·59	2·36
4. Holland	4·42	6·34	6·74	8. Turkey	2·22	2·03	1·95

EGYPT.—IMPORTS.[1]

A. Principal Articles.	Average Value in Millions Sterling				Percentages				Principal Countries of Origin
	1875	'76-80	'81-5	'86-90	1875	'76-80	'81-5	'86-90	
1. Cotton manufactures	1·59	1·19	1·64	1·39	27·2	20·2	18·9	17·2	U.K
2. Coal . . .	0·99	0·64	0·72	0·45	17·0	10·9	8·3	5·5	U.K.
3. Wood . . .	0·15	0·16	0·30	0·37	2·5	2·7	3·5	4·6	U.K., Tur.
4. Wool manufactures.	0·20	0·21	0·27	0·21	3·4	3·5	3·1	2·6	A.-H., U.K.
5. Indigo . . .	0·19	0·18	0·27	0·21	3·3	3·0	3·1	2·6	B.E.I.
6. Wines and spirits .	0·13	0·13	0·24	0·23	2·3	2·2	2·8	2·8	Fr., A.-H., It.
7. Coffee . . .	0·02	0·11	0·25	0·25	0·3	1·9	2·8	3·1	Tur., B.E.I.
Average total value	5·85	5·90	8·69	8·09					

B. From	Percentages of Total Value			
	1874-5	1876-80	1881-5	1886-90
1. United Kingdom[2] .	55·15	46·98	38·92	39·06
2. Turkey . . .	1·51	13·38	20·79	18·78
3. France and Algeria	19·97	16·48	12·93	10·66
4. Austria-Hungary .	9·80	10·94	11·57	9·94

SPECIAL EXPORTS.

A. Principal Articles	Average Value in Millions Sterling				Percentages				Principal Destinations
	1875	'76-80	1881-5	'86-90	1875	'76-80	1881-5	'86-90	
1. Cotton, raw .	9·22	7·60	8·26	7·98	66·4	58·3	65·1	69·3	U.K., Rus.
2. Cotton seed .	1·29	1·45	1·51	1·40	9·3	11·1	11·9	12·1	U.K., Fr.
3. Beans . .	0·58	0·72	0·73	0·52	4·1	5·5	5·8	4·6	U.K., Fr.
4. Sugar . .	0·52	0·75	0·46	0·48	3·7	5·8	3·6	4·2	It., U.K.
5. Wheat . .	1·08	0·89	0·35	0·20	7·8	6·8	2·7	1·7	U.K., Fr.
6. Gums . .	—	0·21	0·15	0·006	—	1·6	1·2	0·05	
7. Rice . .	—	0·16	0·14	0·10	—	1·3	1·1	0·9	Tur.
Average total value .	13·89	13·03	12·69	11·5					

B. To	Percentages of Total Value			
	1874-5	1876-80	1881-5	1886-90
1. United Kingdom .	75·01	66·51	64·86	64·06
2. France and Algeria.	10·80	10·26	8·53	8·26
3. Russia . . .	1·50	5·72	8·18	8·68
4. Italy . . .	3·06	5·45	6·48	6·55
5. Austria-Hungary .	5·81	3·46	4·71	6·68
6. Turkey . . .	3·04	6·66	4·60	3·23

[1] Goods in transit are included previous to the year 1884.
[2] Including British Possessions in the Mediterranean.

CEYLON.—IMPORTS

(INCLUDING BULLION AND SPECIE).

A. Principal Articles	Average Value in Millions Sterling[1]				Percentages (Rupee Values)			
	1871–5	1876–80	1881–5	1886–90	1871–5	1876–80	1881–5	1886–90
1. Rice and paddy[2] .	1·81	1·87	1·63	1·59	34·4	39·0	42·0	39·3
2. Specie and bullion . .	0·96	0·68	0·42	0·41	18·2	14·1	11·0	10·1
3. Cotton manufactures . .	0·81	0·59	0·38	0·35	15·5	12·1	9·8	8·6
4. Coal and coke .	0·19	0·15	0·29	0·42	3·7	3·2	7·5	10·4
Average total value .	5·25	4·83	3·89	4·04				

EXPORTS

(INCLUDING BULLION AND SPECIE).

A. Principal Articles[3]	Average Value in Millions Sterling				Percentages (Rupee Values)			
	1871–5	1876–80	1881–5	1886–90	1871–5	1876–80	1881–5	1886–90
1. Coffee . . .	3·16	3·28	1·26	0·56	71·7	73·8	43·4	18·2
2. Coco-nut oil .	0·21	0·23	0·28	0·31	4·7	5·2	9·9	10·0
3. Cinchona bark[4] .	—	—	0·28	0·17	—	—	10·0	5·4
4. Tea[5] . . .	—	—	0·09	0·96	—	—	4·6	31·4
Average total value .	4·40	4·44	2·90	3·06				

[1] Down to 1872, inclusive, the accounts of the commerce of Ceylon were kept in sterling. For the years 1873–75 the official rate of conversion, 1 rupee = 1s. 10½d., has been adopted. In the case of India the official rate of conversion, 10 rupees = 1l., has been adopted down to 1870. For the following years in India, and for the years 1876–85 in Ceylon, the rupee has been converted at the average rate of exchange on London, namely:—

Year .	1870–1	1871–2	1872–3	1873–4	1874–5	1875–6	1876–7	1877–8
Pence .	22·5	23·1	22·7	22·3	22·1	21·6	20·5	20·8
Year .	1878–9	1879–80	1880–1	1881–2	1882–3	1883–4	1884–5	1885–6
Pence .	19·8	20·0	20·0	19·9	19·5	19·5	19·3	18·2
Year .	1886–7	1887–8	1888–9	1889–90	1890–91			
Pence .	17·44	16·9	16·4	16·5	18·5			

For Ceylon the figures in the *Colonial Abstract* which have been obtained by conversion at rates approximating to these have been adopted for 1886–90.

[2] Paddy = rice in the husk.

[3] The exports next in value to the four mentioned below are graphite (423·14), cinnamon (341), and areca- or betel-nuts (339). Areca-nuts are the fruit of a palm, *Areca Catechu* L., cultivated not only in Ceylon, but also throughout tropical India, and in other parts of the monsoon region of Asia.

[4] Insignificant till 1880. [5] Insignificant till 1884.

INDIA.—GENERAL IMPORTS BY SEA.[1]

A. Principal Articles	Average Value in Millions Sterling[2]						Percentage (calculated on Rupee Values)					
	1860–5[3]	1865–70	1871–5	1876–80	1881–6	1887–91	1860–5	1865–70	1870–5	1875–80	1880–6	1887–91
1. Cotton manufactures	11·21	16·34	17·07	16·23	20·14	21·24	45·3	49·1	56·5	50·2	48·9	45·9
Cotton tissues	*9·57*	*13·80*	*14·41*	*13·85*	*17·40*	*18·68*	*38·7*	*42·3*	*47·7*	*42·9*	*42·3*	*40·4*
Cotton twist and yarn	*1·64*	*2·54*	*2·66*	*2·38*	*2·74*	*2·56*	*6·6*	*7·8*	*8·8*	*7·3*	*6·6*	*5·5*
2. Metals	3·03	3·39	2·11	2·93	3·58	3·64	12·2	10·4	6·9	9·1	8·7	7·9
3. Railway materials	—	—	0·62	0·73	1·15	1·47	—	—	2·0	2·3	2·8	3·2
4. Machinery & mill-work	0·61	0·71	0·67	0·80	1·02	1·42	2·4	2·2	2·2	2·4	2·5	3·1
5. Woollen goods	—	—	0·57	0·73	0·98	1·16	—	—	1·9	2·3	2·4	2·5
6. Coal and coke	—	—	0·54	0·79	0·94	1·10	—	—	1·8	2·5	2·3	2·4
Average total value:—												
Private merchandise	24·75	32·62	30·21	32·19	41·08	46·20						
Including Govt. stores	—	—	31·68	33·67	43·22	48·22						
Bullion and specie (*less exports*)	*16·97*	*14·41*	*5·23*	*6·63*	*9·18*	*9·92*	*68·6*[4]	*44·2*[4]	*16·8*[4]	*20·4*[4]	*22·4*[4]	*21·5*[4]

B. From	Percentages				Principal Articles
	1872–5	1876–80	1881–5	1886–90[5]	
1. United Kingdom	75·46	77·28	75·73	78·59	1. Cottons, metals, machinery
2. China (including Hong Kong)	—	7·40	6·31	3·54	2. Raw silk, sugar, silks
China (excluding Hong Kong)	—	*1·29*	*1·31*	*0·57*	
Hong Kong	*5·47*	*6·11*	*5·01*	*2·97*	
3. Straits Settlements	2·27	2·53	2·56	3·27	5. Tin, raw silk, betel-nuts
4. Australasia	0·98	0·58	2·48	0·65	6. Copper, horses
5. United States	0·26	0·61	1·11	1·89	7. Mineral oil

[1] Exclusive of Government imports and exports, except in the case of bullion and specie.
[2] For rate of conversion see under Ceylon, p. 585.
[3] For years ending April 30 down to 1866, after that for years ending March 31.
[4] Percentage of value of merchandise, excluding bullion and specie.
[5] In this period the percentage of the imports from Mauritius (chiefly sugar) was 2·49.

GENERAL EXPORTS BY SEA.

A. Principal Articles	Average Value in Millions Sterling						Percentages (calculated on Rupee Values)					
	1860–5	1865–70	1871–5	1876–80	1881–6	1887–91	1860–5	1865–70	1870–5	1875–80	1880–6	1887–91
1. Raw cotton	21·95	22·27	15·68	9·19	11·18	11·15	43·7	42·2	29·2	17·1	16·7	16·3
2. Opium	10·78	11·25	11·08	10·80	9·51	7·28	21·4	21·3	20·6	20·2	14·2	10·6
3. Rice (including paddy)	3·90	3·81	4·66	6·03	6·82	7·05	7·7	7·2	8·6	11·3	10·2	10·3
4. Oil-seeds	1·75	1·99	2·51	4·74	6·77	6·87	3·4	3·7	4·6	8·8	10·2	10·0
5. Wheat	0·11	0·07	0·34	1·27	5·57	4·79	0·2	0·1	0·6	2·3	8·4	7·0
6. Jute[1]	1·08	1·59	3·47	2·92	3·83	5·00	2·1	3·0	6·4	5·4	5·7	7·3
7. Hides and skins	0·79	1·04	2·40	2·83	3·64	1·64	1·5	1·9	4·4	5·3	5·5	2·4
8. Indigo	1·85	2·30	3·10	2·61	3·35	2·63	3·6	4·3	5·7	4·8	5·0	3·8
9. Tea	0·22	0·69	1·49	2·41	3·12	3·80	0·4	1·3	2·7	4·5	4·7	5·5
Average total value	50·16	52·75	53·64	53·39	66·66	68·50[2]						

B. To	Percentages				Principal Articles
	1872–5	1876–80	1881–5	1886–90[3]	
1. United Kingdom	49·83	44·25	41·27	38·95	1. Cotton, wheat, jute, oil-seeds, tea
2. China (including Hong Kong)	—	20·53	16·18	14·54	2. Opium, cotton yarns and goods
3. *China (excluding Hong Kong)*	—	*4·38*	*4·33*	*3·22*	
4. *Hong Kong*	*14·83*	*16·15*	*11·85*	*11·32*	
5. France	6·11	7·61	9·16	8·17	5. Oil-seeds, wheat, cotton
6. Straits Settlements	3·56	4·06	4·04	4·58	6. Rice, cotton, and cottons
7. Italy	1·91	2·56	3·90	4·60	7. Cotton, oil-seeds, hides
8. United States	3·50	3·34	3·64	3·77	8. Jute and jute manufactures, oil-seeds, indigo
9. Austria-Hungary	1·87	2·31	2·83	2·89	9. Cotton
10. Egypt	0·03	0·83	2·80	3·55	10. Rice, wheat, oil-seeds, indigo
11. Ceylon	4·13	4·71	2·63	2·22	11. Rice
12. Belgium	0·09	0·25	2·62	4·49	12. Cotton, oil-seeds, wheat
13 Australasia	0·23	0·62	0·91	0·94	13. Gunny-bags, wheat

[1] Including till 1874 jute manufactures, which before 1877 never exceeded 500,000*l.* in value. In 1889–90 their value was 1,919,000*l.*

[2] Of which 4·3 per cent. was of non-Indian origin. [3] In this period the percentage value of the exports to Germany was 1·38, to Mauritius 1·04, to Japan 0·77. The exports to Germany increased from 310,000*l.* in 1885–6 to 1,913,000*l.* in 1889–90.

CHINA.—IMPORTS.
(EXCLUDING HONG KONG.[1])

	Average Value in Millions Sterling[2]			Percentages		
	1876–80	1881–5	1886–90	1876–80	1881–5	1886–90
1. Opium	9·32	7·83	7·06	42·4	35·0	26·1
2. Cottons	5·90	6·87	9·37	26·8	30·7	34·7
3. Metals	1·19	1·31	1·54	5·4	5·8	5·7
4. Woollens	1·44	1·26	1·16	6·5	5·6	4·3
Average totals	21·98	22·38	27·01			

EXPORTS.

	Average Value in Millions Sterling			Percentages		
	1876–80	1881–5	1886–90	1876–80	1881–5	1886–90
1. Tea	10·01	8·74	7·27	46·7	46·2	33·9
2. Silk and silk goods	8·32	6·48	7·78	38·8	34·2	36·2
Silk, raw & thrown	*6·58*	*4·57*	*4·77*	*30·7*	*24·1*	*22·2*
Silk, piece goods	*1·33*	*1·16*	*1·67*	*6·2*	*6·1*	*7·8*
Average totals	21·41	18·92	21·46			

IMPORTS.

	Percentages			
	1873–5	1876–80	1881–5	1886–90
1. Hong Kong	36·89	36·67	37·70	53·86
2. United Kingdom	29·98	25·26	24·35	22·39
3. India	24·17	26·49	22·98	8·65
4. Japan	3·92	4·54	5·06	5·63
5. United States	0·74	2·08	3·64	3·39
6. Continent of Europe	0·94	1·69	2·82	2·63

EXPORTS.

	Percentages			
	1873–5	1876–80	1881–5	1886–90
1. United Kingdom	48·79	39·55	32·55	18·59
2. Hong Kong	15·54	21·26	25·24	35·39
3. Continent of Europe (excluding Russia)	10·53	13·79	12·82	14·89
4. United States	10·71	10·90	12·48	9·77
5. Russia in Asia	3·12	5·07	5·07	5·44
6. Australasia	3·19	2·55	2·79	2·37

[1] The returns are exclusive of the trade in native junks before June 1887.
[2] Rate of conversion of the tael:—

Year	1876	1877	1878	1879	1880	1881	1882	1883
Value	5s. 11½d.	6s.	5s. 11½d.	5s. 7d.	5s. 9½d.	5s. 6½d.	5s. 8½d.	5s. 7½d.
Year	1884	1885	1886	1887	1888	1889	1890	
Value	5s. 7d.	5s. 3½d.	5s. 0½d.	4s. 10½d.	4s. 8¾d.	4s. 8¾d.	5s. 2½d.	

JAPAN.—IMPORTS.

Principal Countries of Origin	Value in Millions Sterling[1]		Percentage		Principal Articles in 1887
	Average, 1881–5	1887	Average, 1881–5	1887	
1. United Kingdom	2·79	3·88	48·1	46·9	Cotton yarns and goods, woollens, metals, machinery, railway material.
2. China[2] . .	1·26	1·26	18·3	15·2	Sugar.
3. United States .	0·54	0·67	9·4	8·1	Petroleum, clocks, flour.
4. India[2] and Siam	0·46	0·84	8·0	10·1	Cotton yarns, leather, raw cotton, saltpetre.
5. France . .	0·39	0·47	6·6	5·7	Fine woollens and wine.
6. Germany . .	0·31	0·82	5·2	9·9	Machinery, metals, woollen goods.
7. Switzerland .	0·06	—	1·1	—	Watches.
Total . .	5·82	8·28			

EXPORTS.

A. Principal Articles	Percentage of Total Value		Principal Articles	Percentage of Total Value	
	1871–5	1881–5		1871–5	1881–5
1. Total silk . .	47·5	45·7	6. Rice	4·8	3·4
Raw silk . . .	*35·9*	*38·9*	7. Copper	3·8	3·3
Silk waste . .	*2·6*	*6·5*	8. Seaweed and Seaweed jelly[3] .	2·9	2·4
Silkworms' eggs .	*9·0*	*0·3*			
2. Tea . . .	31·4	18·9	9. Camphor .	0·7	2·0
3. Sea animals .	3·6	4·4	10. Mushrooms . .	0·9	1·0
4. Artistic products .	2·4	4·4	11. Sumach tallow .	1·4	0·7
5. Coal . . .	2·9	4·3	12. Tobacco . .	2·8	0·6

B. Principal Destinations	Value in Millions Stg.		Percentage		Principal Articles to each Country (1887)
	1881–5	1887	1881–5	1887	
1. United States .	2·35	3·41	39·0	41·6	Silk, tea, camphor, sulphur.
2. France .	1·47	1·51	24·4	18·4	Silk, rice, porcelain, and fancy ware.
3. China . .	1·05	1·68	17·4	20·5	Copper and copper coins, sea animals, mushrooms, seaweed.
4. United Kingdom	0·68	0·55	11·3	6·7	Rice, silk, camphor, antimony.
5. Germany . .	—	0·15	Each a little more than 1 per cent.	1·8	Rice, camphor, porcelain, and fancy ware.
6. India and Siam	—	0·07		0·9	Rice, fancy ware.
7. Canada . .	—	0·11	—	1·4	Tea, silk.
Total . .	6·03	8·18			

[1] Down to 1887 inclusive, Japanese imports, with the exception of those from China and the East Indies, were entered in the Customs returns of Japan at the values at which they were invoiced in the countries of origin, converted into yen at the uniform rate of 4·88 yen to the £. The figures in this table represent these values reconverted, except in the case of China and the East Indies, the values for which are calculated on the basis of 3*s.* 9*d.* to the yen for 1881 to 1883, 3*s.* 6*d.* in 1884 and 1885, and 3*s.* 2*d.* in 1887. These rates of conversion are adopted for the whole of the export tables. (See Foreign Office Papers, Annual Series, Nos. 200 and 426.)

[2] The imports from India and China are largely of British origin.

[3] Japanese isinglass.

CANADA.—GENERAL IMPORTS.

A. Principal Articles	Average Value in Millions Sterling 1872-5	1876-80	1881-5	1886-90	Percentages 1872-5	1876-80	1881-5	1886-90	Principal Countries of Origin
1. Iron and steel, all kinds .	3·80	1·92	3·18	2·97	14·9	10·1	13·1	12·8	U.K., U.S.
2. Woollen mnfs.	2·98	1·62	1·82	2·06	11·7	8·6	7·5	8·9	U.K.
3. Cotton "	2·19	1·51	1·77	0·96	8·6	8·0	7·3	4·1	U.K., U.S.
4. Coal . .	0 60	0·68	1·70	1·67	2·3	3·6	7·0	7·2	U.S.
5. Wheat and flour	1·56	1·74	1·44	0·77	6·1	9·2	5·9	3·3	U.S.
6. Sugar . .	1·03	1·08	1·08	1·09	4·0	5·7	4·4	4·7	U.S., W.I.
7. Tea . .	0·88	0·66	0·73	0·69	3·4	3·5	3·0	3·0	U.S.
Average total value	25·56	18·92	24·26	23·23					

CANADA.—GENERAL EXPORTS.

A. Principal Articles	Average Value in Millions Sterling 1872-5	1876-80	1881-5	1886-90	Percentages 1872-5	1876-80	1881-5	1886-90	Principal Destinations
1. Timber . .	4·69	3·44	4·50	4·00	26·5	20·9	22·6	21·6	U.K.
2. Animals . .	0·50	0·74	1·68	1·98	2·8	4·5	8·5	10·7	U.S., U.K.
3. Barley and rye	0·73	1·14	1·67	1·19	4·1	6·9	8·4	6·4	U.S.
4. Wheat . .	1·24	2·06	1·58	0·97	7·0	12·5	7·9	5·2	U.K.
5. Cheese . .	0·60	0·84	1·49	1·83	3·4	5·1	7·5	9·9	U.K.
6. Dried fish .	0·57	0·69	0·72	0·59	3·2	4·2	3·6	3·2	W.I., Braz.
Average total value	17·7	16·5	19·9	18·58					

IMPORTS B. From	Percentages 1872-5	1876-80	1881-5	1886-90	EXPORTS B. To	Percentages 1873-5	1876-80	1881-5	1886-90
1. U.S. .	39·11	50·44	44·33	42·68	1. U.K. .	48·15	53·17	48·37	47·16
2. U.K. .	52·94	42·17	42·93	37·25	2. U.S. .	42·10	36·26	42·68	44·55
3. Ch. & Jap.	0·81	0·71	1·68	2·01	3. S. Am. .	1·27	0·88	1·13	1·43

NEWFOUNDLAND.

IMPORTS From	Percentages 1871-5	1876-80	1881-5	1886-90	EXPORTS To	Percentages 1871-5	1876-80	1881-5	1886-90	Principal Articles
U.K. .	37·30	34·42	36·67	35·40	U.K.	30·68	37·03	25·34	23·76	Train oil and blubber, dried fish
U.S. .	25·31	28·67	28·32	23·45						
British Possessions .	—	—	27·15	37·28	Braz.	18·98	22·41	22·15	21·18	Dried codfish
					Port.	14·25	12·14	20·34	19·15	
Aver. val. in m. stg.	1·43	1·49	1·63	1·33	—	1·35	1·27	1·38	1·20	

JAMAICA.—EXPORTS.

A. Principal Articles	Average Value in Millions Sterling				Percentages			
	1871–5	1876–80	1881–5	1886–90	1871–5	1876–80	1881–5	1886–90
1. Fruit [1]	—	—	—	0·31	—	—	—	19·2
2. Sugar	0·52	0·45	0·45	0·25	38·3	31·7	31·8	15·2
3. Rum	0·28	0·25	0·23	0·21	20·8	17·9	16·3	12·6
4. Coffee	0·23	0·26	0·16	0·25	17·4	18·7	11·1	15·1
5. Logwood	0·13 [2]	0·18	0·12	0·30	10·0	12·8	8·5	18·4
Total	1·35	1·41	1·41	1·63				

[1] Bananas and oranges.
[2] 1871–4.

IMPORTS.

B. From	Percentages			
	1871–5	1876–80	1881–5	1886–90
1. United Kingdom	58·15	53·10	54·35	55·98
2. United States	25·74	30·22	30·92	32·79
3. British North America	12·64	12·62	11·18	8·36

EXPORTS.

B. To	Percentages			
	1871–5	1876–80	1881–5	1886–90
1. United Kingdom	81·17	75·87	52·61	37·42
2. United States	9·95	14·87	26·00	47·65
3. British North America	0·92	1·37	10·98	2·14

CAPE COLONY.—EXPORTS.

Principal Articles	Average Value in Millions Sterling				Percentages			
	1871–5	1876–80	1881–5	1886–90	1871–5	1876–80	1881–5	1886–90
1. Diamonds	—	2·56	3·24	4·05	—	39·8	42·7	45·7
2. Wool	2·80	2·20	1·88	1·98	65·7	34·1	24·8	22·3
3. Ostrich feathers	0·20	0·57	0·89	0·44	4·6	8·9	11·8	4·9
4. Copper ore	0·27	0·28	0·38	0·68	6·4	4·3	5·0	7·6
5. Angora hair	0·07	0·14	0·25	0·30	1·8	2·1	3·2	3·4
Average total value	4·26	6·44	7·60	8·86				

ARGENTINE REPUBLIC.—SPECIAL IMPORTS.

A. Principal Articles	Average Value		Percentage of Total	
	1876–80	1881–5	1876–80	1881–5
1. Cotton manufactures	1·11	1·42	13·2	9·3
2. Wine	0·96	1·28	11·3	8·0
3. Sugar	0·74	0·89	8·8	5·8
4. Spirits and liqueurs	0·36	0·35	4·2	2·3
5. Coal	0·14	0·30	1·7	1·9
6. Olive Oil (not bottled)	0·16	0·23	1·9	1·5
Average total value	8·41	15·21		

B. From	Percentage of Total Value			Principal Articles
	1873–4	1876–80	1881–5	
1. United Kingdom	28·00	26·23	34·50	Cottons and other textiles, iron and iron wares, coal
2. France	24·08	20·38	18·04	Wines and spirits, woollens, refined sugar
3. Germany	4·35	5·05	8·19	Cottons and woollens
4. United States	7·17	6·73	7·49	Wood and wooden wares, iron and iron wares, petroleum
5. Belgium	3·84	5·52	6·34	Textiles, iron and iron wares
6. Italy	5·04	5·84	4·54	Olive oil, rice and other food-stuffs

SPECIAL EXPORTS.

A. Principal Articles	Average Value		Percentage of Total	
	1876–80	1881–5	1876–80	1881–5
1. Unwashed wool [1]	4·12	6·30	43·6	48·1
2. Dried ox-hides	1·04	1·23	11·0	9·4
3. Dirty sheep-skins [2]	0·88	1·01	9·3	7·7
4. Beef salted and hung	0·53	0·63	5·6	4·8
5. Salted ox-hides	0·62	0·62	6·6	4·7
6. Tallow	0·69	0·49	7·3	3·7
7. Wheat	0·06	0·40	0·6	3·0
8. Flax	—[3]	0·34	—	2·6
Average total value	9·44	13·10		

B. To	Percentage of Total Value			Principal Articles
	1873–4	1876–80	1881–5	
1. France	18·25	23·47	30·49	Wool, sheep-skins
2. Belgium	32·32	27·67	21·29	Wool
3. United Kingdom	16·94	10·84	11·34	Hides, grain, flax, wool
4. Germany	1·37	3·29	8·76	Wool
5. United States	7·62	6·99	6·09	Hides, skins, wool
6. Italy	—	3·26	3·03	Dried ox-hides, sheep-skins, wool

[1] In 1886, 47 p.c. of total to France, 24½ p.c. to Belgium, 17 p.c. to Germany.
[2] In 1886, 70 p.c. of total to France.
[3] Insignificant.

MEXICO.—IMPORTS.

		Percentage of Total Value[1]	
		1888–9	1899
United States	In earlier years no returns	56·6	48·8
United Kingdom		15·8	18·4
France		12·4	11·5
Germany		7·0	10 8
Spain		4·8	5·4

EXPORTS.

	Percentage of Total Value				
	1873–5	1878–80	1882–4	1886–8	1899
1. United States	38·51	41·31	44·49	59·43	78·5
2. United Kingdom	36·41	34·17	39·85	25·05	7·0
3. France	16·61	17·20	7·88	9·54	3·9
4. Spain	2·65	2·55	3·50	1·40	—
5. Germany	1·69	2·85	3·06	4·18	2·5
	95·87	98·08	98·78	99·60	—

BRAZIL.

Ratio per cent. of the five chief articles of Export to the total value of the five at different dates							
	1841	1851	1861	1871	1881	1901–2[2]	1901–2 Average value in mln. £
Coffee	51·6	57·1	78·0	57·9	71·5	57·5	22·16
Sugar	34·5	27·6	11·0	16·0	14·7	3·2	1·24
Rubber	0 6	1·8	3·6	5·1	6·7	20·2	7·80
Tobacco	1·9	3·0	2·5	4·3	4·2	3·7	1·43
Cotton	11·4	10·5	4·9	16·7	2·9	2·2	0·83

CHILE.—IMPORTS.

	Percentage of Total Value			Principal Articles
	1874–5	1876–80	1881–5	
1. United Kingdom	43·05	36·69	41·11	Cottons, coal, iron
2. Germany	10·29	12·42	18·38	Refined sugar, woollens
3. France	19·51	18·87	15·69	Woollens, wine, refined sugar
4. United States	5·59	6·40	6·22	
5. Argentine Republic	5·33	8·33	6·11	Animals
	83·77	82·71	87·51	

EXPORTS.

	Percentage of Total Value			Principal Articles
	1874–5	1876–80	1881–5	
1. United Kingdom	60·57	65·31	73 92	Nitrate of soda, copper, guano, silver ore
2. France	6·21	7·41	6·68	Nitrate of soda, copper
3. Germany	2·24	3·86	5·80	Nitrate of soda
4. Peru	16·03	7·84	4·66	Wheat
5. United States	1·36	2·94	3 25	Nitrate of soda
	86·41	87·36	94·31	

[1] Total value of imports 1888 9, 8,339,000*l.*; in 1899, 11,254,000*l.* Of exports, 1888–9, 12,533,000*l.*; 1899, 14,100,000*l.*

[2] In 1901–2 the average value of maté and cacao exported was somewhat above that of cotton. The average value of the total exports in these two years was about 38,500,000*l.*

UNITED STATES.—GENERAL IMPORTS
(EXCLUSIVE OF BULLION AND SPECIE).

A. Principal Articles	Average Annual Value in Millions Sterling [1]						Percentages of Total Value					
	1861–5	1866–70	1871–5	1876–80	1881–5	1886–90	1861–5	1866–70	1871–5	1876–80	1881–5	1886–90
1. Sugar and molasses	6·42	12·48	18·20	17·00	19·74	18·32	12·1	14·7	15·1	16·5	14·2	12·8
2. Coffee	3·01	4·80	9·11	11·25	10·05	18·02	5·6	5·6	7·5	10·9	7·2	8·7
3. Woollen tissues (exclusive of carpets)	4·96	7·58	8·80	5·72	7·67	9·82	9·3	8·9	7·3	5·4	5·4	6·6
4. Silk manufactures	3·04	4·58	6·10	5·06	7·16	6·94	5·7	5·4	5·1	4·9	5·1	4·6
5. Iron and steel, and manufactures thereof (excluding tin-plate)	1·91	3·42	4·80	2·52	5·69	5·17	3·5	4·0	4·0	2·0	4·1	3·5
6. Hides and skins (excluding furs)	1·27	2·26	3·34	3·38	5·24	5·08	2·4	2·7	2·8	3·3	3·7	3·4
7. Flax manufactures (including jute manufactures from 1881)	1·66	3·77	3·90	3·38	4·68	5·08	3·1	4·4	3·3	3·2	3·3	3·4
8. Tin, tin-plates, and other manufactures of tin	0·91	1·84	3·26	2·98	4·50	5·47	1·7	2·2	2·6	2·9	3·2	3·7
9. Miscellaneous fruits	0·53	1·22	2·10	2·27	3·61	4·08	1·0	1·4	1·7	2·2	2·6	2·7
10. Tea	1·43	2·59	4·51	3·57	3·55	2·96	2·7	3·0	3·7	3·4	2·5	2·0
11. Rubber, crude	0·26	0·50	1·03	1·25	2·65	2·87	0·5	0·6	0·8	1·2	1·9	1·9
12. Raw silk	0·26	0·68	1·09	1·57	2·61	4·08	0·5	0·7	0·9	1·5	1·8	2·7

[1] See p. 483, n. 1.

UNITED STATES.—SPECIAL EXPORTS
(EXCLUSIVE OF BULLION AND SPECIE).

A. Principal Articles	Value or Average Value in Millions Sterling[1]						Percentages					
	1865	1868	1873	1878	1881–5	1886–90	1865	1868	1873	1878	1881–5	1886–90
1. Raw cotton	0·70	22·7	41·12	36·5	45·57	46·79	2·5	40·5	39·2	25·2	28·2	31·0
2. Wheat and wheat flour	4·8	7·59	12·82	24·8	32·83	22·15	16·8	13·7	12·2	17·1	20·2	14·7
Wheat	*2·0*	*4·49*	*9·31*	*19·7*	*22·85*	*11·84*	*7·0*	*8·2*	*8·9*	*13·6*	*14·1*	*7·8*
Wheat flour	*2·8*	*3·10*	*3·51*	*5·1*	*9·98*	*10·31*	*9·8*	*5·5*	*3·3*	*3·5*	*6·1*	*6·8*
3. Bacon and hams	1·08	0·81	6·34	10·5	9·28	7·45	3·8	1·5	6·0	7·2	5·7	4·9
4. Refined mineral oil	0·71	2·93	6·78	8·84	9·01	9·02	2·5	5·2	6·4	6·1	5·5	6·0
5. Maize	0·38	1·94	4·31	9·71	6·79	5·84	1·3	2·7	4·1	6·7	4·2	3·9
6. Lard	0·94	1·40	3·85	6·09	5·78	5·28	3·3	2·5	3·7	4·2	3·5	3·5
7. Wood and manufactures of wood	1·93	2·25	3·46	3·40	4·79	5·35	6·8	4·0	3·3	2·3	2·9	3·5
8. Tobacco, unmanufactured leaf	4·29	3·40	4·11	5·03	4·04	4·80	15·0	6·1	3·9	3·5	2·5	3·2
9. Animals, living	—	—	0·37	1·17	2·98	3·65	—	—	0·3	0·8	1·8	2·4
10. Cheese	1·20	1·04	1·90	2·86	2·65	1·69	4·2	1·9	1·8	2·0	1·6	1·1
11. Cotton manufactures	0·36	0·72	0·53	2·32	2·64	2·59	1·2	1·3	0·5	1·6	1·6	1·7
Total or average total value	28·48	56·03	105·0	145·3	161·4	151·18						

—	Average Total Value in Millions Sterling[1]								
	1846–50	1851–5	1856–60	1861–5	1866–70	1871–5	1876–80	1881–5	1886–90
Total imports (excluding bullion and specie)	29·27	51·48	66·85	53·15	84·93	120·1	102·5	138·8	149·4
Total exports (excluding bullion and specie, but including articles of foreign origin)	28·67	42·23	61·30	39·06	66·73	104·4	140·8	164·7	153·8
Average excess of imports of bullion and specie	0·46	—	—	—	—	—	0·47	2·17	—
Average excess of exports of bullion and specie	—	7·13	10·23	8·68	10·93	13·14	—	—	8·44

[1] See p. 488, n. 1.

UNITED STATES.—IMPORTS.

B. From	Percentages 1870	1871–5	1876–80	1881–5	1886–90	Principal Articles
1. Great Britain and Ireland	34·88	36·07	26·94	25·72	24·04	1. Tin-plates, linens, woollens, carbonate of soda, and caustic soda
2. France	9·80	7·49	10·63	11·52	9·76	2. Wine, precious stones, woollens, silks
3. Cuba	12·33	12·18	12·49	8·94	7·14	3. Sugar, tobacco, and cigars
4. Germany	6·19	7·50	7·72	8·84	11·40	4. Sugar, silks, woollens
5. Brazil	5·77	6·40	9·06	7·24	7·48	5. Coffee, rubber, sugar
6. British North America	8·31	5·85	5·60	6·29	5·60	6. Barley, wood
7. China, including Hong Kong	3·34	3·71	3·46	3·08	2·63	7. Tea
8. British East Indies	2·30	2·47	2·79	2·78	2·66	8. Jute, pepper, hides
9. Belgium	0·72	0·94	1·23	2·29	1·29	9. Glass (chiefly common)
10. Italy	1·52	1·40	1·61	2·00	2·59	10. Sulphur, oranges
11. Japan	0·70	1·17	2·47	2·00	2·47	11. Tea
12. Brit. West Indies, Honduras, and Guiana	1·48	1·28	1·88	1·81	2·29	12. Sugar
13. Spanish Possessions except Cuba and Porto Rico	1·53	1·13	1·36	1·52	1·43	13. Sugar
14. Mexico	—	—	1·15	1·30	2·42	14. Henequen, coffee, skins
15. Hawaiian Islands	0·26	0·20	0·58	1·14	1·56	15. Sugar, rice
16. Holland	—	—	0·75	1·10	1·62	16. Leaf-tobacco, precious stones
17. Porto Rico	1·87	1·47	0·94	0·84	0·60	17. Sugar
18. British Possessions in Australasia	0·06	0·43	0·31	0·51	0·66	18. Clothing wool

UNITED STATES.—EXPORTS.

B. To	Percentages 1870	1871–5	1876–80	1881–5	1886–90	Principal Articles
1. Great Britain and Ireland	51·60	53·62	53·07	53·01	52·11	1. Cotton, wheat and flour, bacon, hams, and lard
2. Germany	8·80	8·86	7·86	7·91	8·95	2. Cotton, refined petroleum, tobacco, lard
3. France	9·45	5·95	9·46	7·59	6·27	3. Cotton, maize, refined petroleum
4. British North America	5·45	6·31	4·92	5·33	4·91	4. Coal, wheat and flour, maize, cotton
5. Belgium	1·48	2·63	3·48	3·49	3·40	5. Wheat.
6. Holland	—	—	1·93	2·33	2·38	6. Wheat and flour, tallow, cotton-seed
7. Cuba	2·98	2·76	1·75	1·47	1·48	7. Wheat and flour, machinery, coal
8. Mexico	—	—	0·77	1·43	1·29	8. Animals, machinery, iron and steel [manufs.
9. Brit. West Indies, Honduras and Guiana	1·70	1·62	1·33	1·38	1·30	9. Wheat and flour
10. Italy	1·34	1·21	1·30	1·22	1·75	10. Cotton, tobacco, refined petroleum, wheat
11. British Possessions in Australasia	0·72	0·59	0·81	1·15	1·52	11. Boards, deals, and planks, machinery
12. Brazil	1·20	1·22	1·14	1·10	1·18	12. Wheat and flour
13. China and Hong Kong	0·64	0·46	0·75	0·99	1·17	13. Cottons, wheat and flour, ginseng[1]
14. Argentine Republic	0·52	0·35	0·25	0·47	0·90	14. Agricultural implements
15. Hawaiian Islands	0·17	0·12	0·23	0·41	0·49	
16. British East Indies	0·05	0·06	0·15	0·35	0·58	16. Refined petroleum, cottons
17. Japan	0·12	0·18	0·28	0·32	0·56	17. Refined petroleum
18. Porto Rico	0·48	0·40	0·26	0·24	0·27	18. Wheat flour

[1] The product of *Panax quinquefolius*, a native of the Appalachian Mountains, a different species from that which yields the ginseng of Eastern Asia (783).

NEW ZEALAND.—IMPORTS.

(Values in Millions Sterling.)

A. Principal Articles	Average Value				Percentages			
	1871-5	1876-80	1881-5	1886-90	1871-5	1876-80	1881-5	1886-90
1. Drapery[1]	0·83	0·97	1·04	0·54	13·0	13·0	13·2	8·5
2. Iron and ironmongery[2]	0·47	0·56	0·66	0·56	7·3	7·6	8·5	8·8
3. Sugar	0·37	0·50	0·54	0·39	5·9	6·7	6·9	6·1
4. Tea	0·21	0·23	0·23	0·18	3·3	3·1	3·0	2·9
5. Stationery and books	0·13	0·19	0·21	0·19	2·0	2·6	2·6	2·9
6. Coal	0·19	0·23	0·16	0·11	2·9	3·1	2·1	1·7
Average total value	6·37	7·48	7·84	6·30				

B. From	Percentages of Total Value				Principal Articles
	1871-5	1876-80	1881-5	1886-90	
United Kingdom	59·2	61·0	65·0	65·77	All the chief articles
Victoria	24·3	16·8	11·8	9·27	Drapery, tea, sugar, leather, stationery
New South Wales	6·9	9·9	7·6	7·38	Sugar, timber, bone manure, tea
United States	2·2	4·2	5·0	5·25	Railway plant and iron wares
All British Possessions	—	*33·6*	*27·5*	—	
All Foreign Countries	—	*5·4*	*7·5*	—	

EXPORTS.

A. Principal Articles	Average Value				Percentages			
	1871-5	1876-80	1881-5	1886-90	1871-5	1876-80	1881-5	1886-90
1. Wool	2·62	3·33	3·10	3·53	44·8	55·3	46·1	43·6
2. Gold	1·88	1·27	0·94	0·83	32·3	21·1	13·9	10·2
3. Wheat	0·13	0·39	0·63	0·37	2·2	6·4	9·4	4·6
4. Kauri gum	0·13	0·15	0·30	0·34	2·1	2·5	4·4	4·2
5. Preserved meats	0·11	0·50	0·23	0·77	1·8	8·1	3·4	9·5
Average total value	5·83	6·02	6·75	8·09				

B. To	Percentages of Total Value				Principal Articles
	1871-5	1876-80	1881-5	1886-90	
United Kingdom	65·3	78·1	72·9	72·03	All the chief articles
Victoria	22·9	12·8	8·9	8·37	Gold, oats, cheese
New South Wales	6·5	4·7	8·5	10·29	Oats, gold, butter, horses, cheese, preserved meats, cattle
United States	3·2	1·0	5·4	4·71	Gold (to west coast), kauri gum (to east coast)
All British Possessions	—	*19·4*	*20·4*	—	
All Foreign Countries	—	*2·5*	*6·7*	—	

[1] Exclusive of apparel and slops and haberdashery.

[2] Exclusive of railway material, but inclusive of hardware and cutlery.

STATISTICS

OF

THE FIRST QUINQUENNIUM

OF THE

TWENTIETH CENTURY

United Kingdom.—General Imports.

Principal Articles	Average Value in mln. £, 1901–1905	Percentage of Total Value, 1901–1905
1. Corn, total . . .	67·61	12·5
Wheat . . .	*29·93*	*5·5*
Wheat flour . .	*8·46*	*1·6*
Maize . . .	*11·57*	*2·1*
2. Meat, total . . .	49·41	9·1
Bacon and hams .	*16·80*	*3·1*
Fresh beef and mutton	*15·54*	*2·9*
Animals (for food) .	*9·54*	*1·8*
3. Cotton, raw . .	46·97	8·7
4. Wood, all kinds . .	24·76	4·7
5. Wool and mohair .	23·37	4·3
6. Butter and margarine	23·20	4·3
7. Sugar	17·45	3·2
Refined . . .	*10·86*	*2·0*
Unrefined . . .	*6·59*	*1·2*
8. Silk manufactures .	12·87	2·4
9. Woollen manufactures	9·65	1 8
10. Fruit, fresh . .	9·45	1·7
11. Tea	9·32	1·7
12. Chemicals . . .	9·15	1·7
13. Iron and steel . .	8·19	1·5
14. Leather . . .	8·13	1·5
15. Hides, skins, and furs	7·61	1·4
16. Caoutchouc . .	7·02	1·3
17. Eggs	6·39	1·2
18. Cheese	6·38	1·2
19. Petroleum . . .	5·36	1·0
20. Iron ore . . .	4·87	0·9
21. Tin, blocks, ingots, &c.	4·68	0·9
22. Copper, unwrought and part wrought	4·63	0·9
Average total value .	£541·81	100

United Kingdom.—Exports of Native Produce and Manufactures.[1]

Principal Articles	Average Value in mln. £, 1901–1905	Percentage of Total Value, 1901–1905
1. Cotton manufactures, including yarn .	79·13	27·2
Cotton tissues . .	*70·72*	*24·3*
Cotton yarn . .	*8·41*	*2·9*
2. Iron and steel . .	28·84	9·9
3. Coal, cinders, and fuel	27·62	9·5
4. Woollen manufactures, incl. yarn, tops, &c.	24·90	8·6
Woollen tissues . .	*16·59*	*5·7*
Woollen yarn . .	*3·93*	*1·4*
Tops	*2·07*	*0·7*
5. Machinery and steam-engines . . .	20·19	6·9
6. Chemicals . . .	13·32	4·5
7. Apparel, slops, haberdashery & millinery	7·08	2·4
8. Linen manufactures .	6·48	2·2
Linen tissues . .	*5·37*	*1·8*
9. Leather and leather manufactures . .	4·77	1·6
10. Fish	3·56	1·2
11. Copper, wrought and unwrought, and yellow metal . .	3·37	1·2
12. Spirits	2·73	0·9
13. Electrical goods .	2·14	0·7
14. Hardware and cutlery	2·11	0·7
15. Jute manufactures .	2·09	0·7
16. Earthenware, etc. .	1·81	0·6
17. Beer and ale . .	1·75	0·6
18. Books	1·74	0·6
Average total value .	£291·12	100

United Kingdom.—General Imports.

Principal Countries of Origin	Average Value in mln. £, 1901–1905	Percentage of Total Value, 1901–1905
1. United States . .	124·98	23·1
All British Possessions .	*114·83*	*21·2*
2. France	51·08	9·4
3. Holland	34·57	6·4
4. Germany	34·02	6·3
5. British India . .	32·19	5·9
6. Russia	28·66	5·3
7. Belgium	26·86	5·0
8. N. Amer. Colonies .	24·13	4·5
9. Australian Com. .	22·31	4·1
10. Argentine Republic .	18·78	3·5
11. Denmark and Iceland	15·73	2·9
12. Sweden and Norway .	15·51	2·9
13. Spain	13·96	2·6
14. Egypt	13·59	2·5
15. New Zealand . .	12·20	2·2
16. Brazil	6·45	1·2
17. Straits Settlements .	6·24	1·2
18. Turkey	5·79	1·1
19. Cape Col. and Natal[2]	5·52	1·0
20. Ceylon	4·37	0·8
Average total value .	£541·81	100

United Kingdom.—Exports of Native Produce and Manufactures.[1]

Principal Countries of Destination	Average Value in mln. £, 1901–1905	Percentage of Total Value, 1901–1905
All British Possessions	*110·10*	*37·8*
1. British India . .	37·15	12·8
2. Germany . . .	24 96	8·6
3. United States . .	21·77	7·5
4. Cape Col. and Natal .	20·15	6·9
5. Australian Com. .	18·27	6·3
6. France	15·85	5·4
7. China, inc. Hong Kong	11·68	4·0
8. N. Amer. Colonies .	10·94	3·8
9. Argentine Republic .	8·90	3·1
10. Belgium	8·89	3·1
11. Holland	8·82	3·0
12. Russia	8·56	2·9
13. Italy	8·02	2·8
14. Sweden and Norway .	7·67	2·6
15. Egypt	7·01	2·4
16. Turkey	6·48	2·2
17. Japan	6·47	2·2
18. New Zealand . .	6·08	2·1
19. Brazil	5·55	1·9
20. Spain	4·55	1·6
Average total value .	£291·12	100

[1] Exclusive of ships (see next page).

[2] Excluding diamonds from the Cape.

United Kingdom.—Exports of Foreign and Colonial Produce.

Principal Articles	Average Value in mln. £, 1901–1905	Percentage of Total Value, 1901–1905
1. Wool	10·35	14·7
2. Cotton, raw	6·42	9·1
3. Caoutchouc	4·65	6·6
4. Hides, skins, and furs (undressed)	4·54	6·4
5. Tin	3·15	4·5
6. Jute manufactures	1·84	2·6
7. Coffee	1·77	2·5
8. Tea	1·77	2·5
9. Hemp, &c., dressed and undressed	1·70	2·4
10. Jute	1·57	2·2
11. Leather	1·36	1·9
12. Grain (chiefly rice) and flour	1·18	1·7
13. Tallow and stearine	1·15	1·6
14. Silk manufactures, excluding silk lace	1·10	1·5
15. Gums	1·05	1·5
Average total value	£70·26	100

United Kingdom.—Exports of Foreign and Colonial Produce.

Principal Countries of Destination	Average Value in mln. £, 1901–1905	Percentage of Total Value, 1901–1905
1. United States	20·00	28·5
2. Germany	11·24	16·0
All British Possessions	*8·66*	*12·3*
3. France	6·96	9·9
4. Russia	6·32	9·0
5. Holland	4·84	6·9
6. Belgium	4·36	6·2
7. Australian Commonwealth	2·23	3·2
8. North American Colonies	1·74	2·5
9. Cape Colony and Natal	1·70	2·4
10. Sweden and Norway	1·27	1·8
11. British India	0·94	1·3
12. Italy	0·76	1·1
13. Austria-Hungary	0·68	1·0
14. New Zealand	0·54	0·8
Average total value	£70·26	100

In the period 1891–95 the total average annual value of the exports of foreign and colonial origin was £60·53 millions, =21 per cent. of the total exports (of British and Irish, colonial and foreign origin). The corresponding ratio for the period 1896–1900 was 19·7 per cent., and in 1901–1905 19·4 per cent., the value of ships being left out of account in these calculations. The value of new ships and their machinery exported was first entered in the British trade returns in 1899, so that, unless these are deducted, the totals from that year onwards and percentages calculated thereon are not strictly comparable with those for previous years. New ships and their machinery being included, the average annual value of the exports of native produce and manufactures for 1901–5 was £296·95 millions, and the percentage values of the leading articles based on that total were as given below:—

	Value per cent. 1901–5
1. Cotton manufactures, including yarn	27·0
Cotton tissues	24·0
2. Iron and steel	9·7
3. Coal, cinders, and fuel	9·3
4. Woollen manufactures, including yarn	8·4
5. Machinery and steam-engines	6·8
9. New ships and boats and their machinery (value, £5·84 millions)	2·0

Even yet the British tables do not include all 'visible exports,' inasmuch as old ships sold to foreign countries are not entered among the exports. On the average of the five years 1901–5, the net tonnage of such ships annually sold was about 238,000 tons against 166,500 tons of new shipping, including war vessels sold to foreign countries.

The monthly returns of the trade and navigation of the United Kingdom enter separately the amount of coal shipped for use in ships engaged in the foreign trade, but these do not appear in the annual trade returns. The amounts so shipped, in millions of tons, in recent years, were as follows:—

Year	1899	1900	1901	1902*	1903	1904	1905	1906	1907
Mln. tons	12·23	11·75	13·59	15·15	16·80	17·19	17·40	18·59	18·62

From the year 1904 an important addition has been made to the Annual Statement of the Trade of the United Kingdom by the publication of an additional volume giving particulars as to the countries to and from which goods are consigned in the trade with this country. This gives a totally different aspect

especially to the import trade of the United Kingdom with respect to its origin. In most cases the value of the 'exports' to different countries is almost identical with the value given to the consignments to the same countries, but it is otherwise with the imports. The practice has been to enter goods as imported from the country to which the port belongs from which they were despatched to a British port. The result is illustrated by the following table, which shows the value of the 'imports' into and the consignments to the United Kingdom from those countries which show the greatest differences under this head:—

—	1906 Value in thous. £		—	1906 Value in thous. £	
	Imports	Consignments		Imports	Consignments
Germany	38,022	55,908	Roumania	3,613	2,804
Netherlands	36,654	16,218	Cuba and Puerto Rico	213	1,457
Belgium	29,033	17,991	Mexico	848	2,317
Switzerland	—	7,913	Central American States	1,069	1,568
France	53,872	47,099	Chile	6,273	5,061
Italy	3,612	6,569	Bolivia	—	814
Austria-Hungary	1,213	7,008			

The countries that show most difference between the exports and consignments from the United Kingdom are those which have no seaboard and those which contain the inlets to such countries. They are given in the following table:—

—	1906 Value in thous. £		—	1906 Value in thous. £	
	Exports	Consignments		Exports	Consignments
Switzerland	—	1,991	Rhodesia	—	339
Belgium	16,754	15,111	Cape Colony	11,575	9,430
Transvaal	—	3,098	Natal	5,147	4,130
Orange River Colony	—	466	Portuguese E. Africa	2,656	1,915

The meaning of the figures contained in these tables is in a large measure obvious. As stated in par. 592 and illustrated in the map of hinderlands opposite p. 54, Germany is largely dependent on foreign ports for carrying on its transmarine commerce. The figures given in the first table make it pretty plain that its trade with England is largely carried on through the Netherlands and Belgium. Swiss exports to Great Britain come mainly through French and Belgian ports, but the great bulk of the imports into Switzerland from Great Britain come through French ports. Italian imports into Great Britain also come largely through French and Belgian ports, those from Austria-Hungary more largely through Germany than direct, to a considerable extent also through Dutch and Belgian ports. Of the refined sugar which is entered in our tables as imported from Germany, much is really of Austrian origin.[1] Goods from Cuba, Puerto Rico, Mexico, and the Central American States come to us largely through the United States. The figures given in the export table show that the difference between the aggregate value of the 'exports' and 'consignments' to the Cape Colony, Natal, and Portuguese East Africa is exactly equal to the sum of the consignments to the Transvaal, the Orange River Colony, and Rhodesia. Even the mention of the place of consignment does not necessarily show the real origin of the goods or the ultimate destination. In 1906 glass to the value of £108,000 was consigned to Great Britain by merchants in Holland, but it was probably of German, perhaps also of Austrian, make.

[1] In 1906 the value of the refined sugar 'imported' from Germany was £7,135,000, but of that only sugar to the value of £4,729,000 was consigned from Germany, while sugar to the value of £2,418,000 was consigned from Austria.

German Empire: Special Imports.—Articles.

Principal Articles	Average Value in mln. £, 1896–1900	Percentages	Average Value in mln. £, 1901–5	Percentages
1. Grain and flour, &c.	29·11	11·5	33·10	11·0
2. Cotton, raw and waste	12·94	5·1	20·22	6·7
3. Chemicals, drugs, &c.	14·98	5·9	18·14	6·0
4. Wool, raw	12·87	5·1	14·11	4·7
5. Timber	12·77	5·0	10·97	3·7
6. Hides, raw	7·37	2·9	10·80	3·6
7. Animals	7·40	2·9	10·24	3·4
8. Coffee	7·70	3·0	7·69	2·6
9. Cotton and woollen yarns	8·18	3·2	7·35	2·4
10. Silk, raw and cocoons	6·44	2·5	7·35	2·4
11. Copper, raw and scrap	4·58	1·8	6·69	2·2
12. Tobacco, leaf and manufactured	5·51	2·2	6·08	2·0
13. Eggs	4·28	1·7	5·64	1·9
Average total value	£253·20	100	£300·39	100

German Empire: Special Imports.—Countries.

Principal Countries of Origin	Average Value in mln. £, 1896–1900	Percentages	Average Value in mln. £, 1901–1905	Percentages
1. United States	39·72	15·7	47·48	15·8
2. Russia (Europe and Asia)	34·21	13·5	40·55	13·5
3. Austria-Hungary	31·97	12·6	35·58	11·8
4. United Kingdom	31·99	12·6	30·37	10·1
5. France (including Algeria and Tunis)	13·58	5·3	17·28	5·8
6. Argentine Republic	7·89	3·1	13·79	4·6
7. British India	10·52	4·1	13·74	4·6
8. Belgium	10·16	4·0	10·87	3·6
9. Holland	9·33	3·7	10·32	3·4
10. Italy	8·19	3·2	9·60	3·2
Average total value	£253·20	100	£300·39	100

German Empire: Special Exports.—Articles.

Principal Articles	Average Value in mln. £, 1896–1900	Percentages	Average Value in mln. £, 1901–1905	Percentages
1. Iron, steel, and manufactures	19·34	9·8	29·77	12·1
Iron wares, coarse	*7·75*	*3·9*	*10·55*	*4·3*
2. Chemical	19·04	9·6	23·03	9·3
3. Cotton manufactures	9·75	4·9	15·01	6·1
4. Woollen manufactures	8·32	4·2	12·27	5·0
5. Coal	8·12	4·1	10·96	4·4
6. Machinery	7·55	3·8	10·79	4·4
7. Sugar, total	10·08	5·6	9·10	3·7
Sugar, refined	*5·49*	*2·8*	*5·56*	*2·3*
Sugar, raw	*5·50*	*2·8*	*3·45*	*1·4*
8. Books, maps, &c.	6·43	3·3	8·47	3·4
9. Hides and skins	4·37	2·2	7·80	3·2
10. Silk manufactures	6·30	3·2	7·41	3·0
Average total value	£197·35	100	£246·60	100

German Empire: Special Exports.—Countries.

Principal Destinations	Average Value in mln. £, 1896–1900	Percentages	Average Value in mln. £, 1901–1905	Percentages
1. United Kingdom	38·66	19·6	48·75	19·8
2. Austria-Hungary	21·92	11·1	25·90	10·5
3. United States	19·31	9·8	23·40	9·5
4. Holland	15·20	7·7	20·22	8·2
5. Russia (Europe and Asia)	14·94	7·6	17·40	7·1
6. Switzerland	13·05	6·6	15·10	6·1
7. Belgium	10·04	5·1	13·54	5·5
8. France (including Algeria and Tunis)	11·13	5·6	13·48	5·5
9. Denmark	5·63	2·9	7·24	2·9
10. Italy	5·03	2·5	6·85	2·8
Average total value	£197·35	100	£246·60	100

France: Special Imports.—Articles.

Principal Articles	Average Value in mln. £, 1901–1905	Percentages, 1901–1905
1. Raw wool	16·39	9·7
2. Raw cotton	11·99	7·1
3. Silk	11·77	7·0
4. Coal and coke	10·54	6·3
5. Oil, fruits and seeds	8·46	5·0
6. Timber, common and stave	8·00	4·7
7. Hides and skins	6·37	3·8
8. Wine	5·17	3·1
9. Machinery	4·61	2·7
10. Coffee	3·72	2·2
11. Copper	3·42	2·0
12. Flax	3·17	1·9
Average total value	£168·36	100

France: Special Exports.—Articles.

Principal Articles	Average Value in mln. £, 1901–1905	Percentages, 1901–1905
1. Silk manufactures	11·5	6·6
2. Wool, raw	9·2	5·2
3. Wine	9·1	5·2
4. Wool manufactures	8·5	4·8
5. Cotton manufactures	8·0	4·6
6. Haberdashery and small fancy wares	6·6	3·8
7. Silk, raw and waste	6·1	3·5
8. Apparel	5·1	2·9
9. Chemicals and dyes	5·0	2·8
10. Millinery	5·0	2·8
11. Hides, raw	4·8	2·8
12. Hides, tanned, curried	4·8	2·8
Average total value	£174·68	100

France: Special Imports.—Countries.

Principal Countries of Origin	Average Value in mln. £, 1901–1905	Percentages, 1901–1905
1. United Kingdom	22·7	13·5
2. United States	19·3	11·5
3. Germany	17·4	10·3
4. Belgium	13·1	7·8
5. Argentine Republic	10·1	6·0
6. Russia	9·7	5·7
7. Algeria	9·2	5·5
8. British India	9·1	5·4
9. China	7·1	4·2
Average total value	£168·36	100

France: Special Exports.—Countries.

Principal Destinations	Average Value in mln. £, 1901–1905	Percentages, 1901–1905
1. United Kingdom	49·2	28·1
2. Belgium	26·1	15·0
3. Germany	21·0	12·0
4. Algeria	11·7	6·7
5. United States	10·4	6·0
6. Switzerland	9·9	5·7
7. Italy	7·2	4·1
8. Spain	4·7	2·7
9. Indo-China	2·8	1·6
Average total value	£174·68	100

Netherlands.

Table showing the quantity of certain Dutch Imports and Exports, 1908, and their value, calculated on the bases of British prices and Dutch returns respectively. (See p. lxiv.)

Imports.

Commodities	Quantity	Value based on British Prices	Value according to Dutch Returns (12 Gulden = £1)
	Mln. Kilog.	Mln. £	Mln. £
1. Coffee, raw	119·1	6·53	4·37
2. Copper, unwrought	102·2	6·07	8·52
3. Cotton, raw	52·7	3·15	2·64
4. Grain, wheat	1,093·0	9·07	11·84
5. Grain, maize	641·7	3·85	3·48
6. Indigo	1·4	0·42	0·72
7. Oleo-margarine	32·7	1·58	1·22
8. Sugar, raw	55·0	0·58	1·60
9. Tin, unwrought	18·5	2·42	1·54
10. Peruvian bark	7·6	0·28	—

Exports.

Commodities	Quantity	Value based on British Prices	Value based on Dutch Returns (12 Gulden = £1)
	Mln. Kilog.	Mln. £	Mln. £
1. Cheese	53·6	4·56	1·57
2. Peruvian bark	4·7	0·20	15·76
3. Flax, raw	43·5	3·01	2·54
4. Margarine	42·4	2·13	2·83
5. Butter	33·1	3·72	2·76
6. Paper and manufactures	150·3	3·56	5·47
7. Sugar, refined and candy	106·6	1·52	3·57
8. Tin, unwrought	15·6	2·04	1·30

Belgium: Special Imports.—Articles.

Principal Articles	Average Value in mln. £, 1901–1905	Percentages
1. Grain, all kinds	16·12	15·4
2. Minerals, raw[1]	6·45	6·1
3. Wool, raw	5·75	5·5
4. Raw flax and hemp	5·26	5·0
5. Wood for building	4·85	4·6
6. Resin and petroleum	4·36	4·2
7. Oil seeds	3·30	3·1
8. Hides, raw	3·04	2·9
9. Coal and briquettes	2·42	2·3
10. Cotton, raw	2·12	2·0
Average total value	£104·87	100

Belgium: Special Exports.—Articles.

Principal Articles	Average Value in mln. £, 1901–1905	Percentages
1. Iron and steel, all kinds	6·58	7·9
2. Coal and coke	4·66	5·6
3. Machinery	3·87	4·7
4. Grain, all kinds	3·63	4·4
5. Glass and glassware	3·43	4·1
6. Linen and hemp yarn &c.	3·34	4·0
7. Flax, raw	3·25	3·9
8. Zinc, unwrought	2·41	2·9
9. Hides, raw	2·34	2·8
10. Woollen yarn	1·64	2·0
Average total value	£83·05	100

Belgium: Special Imports.—Countries.

Principal Countries of Origin	Average Value in mln. £, 1901–1905	Percentages
1. France	17·06	16·3
2. Germany	13·86	13·2
3. United Kingdom	12·73	12·1
4. United States	10·74	10·2
5. Holland	8·98	8·6
6. Russia	7·38	7·0
7. Argentine Republic	6·61	6·3
8. Roumania	4·82	4·6
Average total value	£104·87	100

Belgium: Special Exports.—Countries.

Principal Destinations	Average Value in mln. £, 1901–1905	Percentages
1. Germany	19·03	22·9
2. United Kingdom	14·59	17·6
3. France	14·55	17·5
4. Holland	9·45	11·4
5. United States	3·51	4·2
6. Spain	1·89	2·3
7. Italy	1·49	1·8
8. Russia	1·28	1·5
Average total value	£83·05	100

Switzerland: Special Imports.—Articles.

Principal Articles	Average Value in mln. £, 1901–1905	Percentages
1. Raw silk	5·34	10·5
2. Wheat	3·26	6·4
3. Iron and steel, all kinds	2·51	5·0
4. Animals	2·27	4·5
5. Coal and coke	2·03	4·0
6. Cotton yarns and tissues	1·72	3·4
7. Woollen yarns and tissues	1·67	3·3
8. Raw cotton	1·44	2·8
9. Wine (in casks)	1·36	2·7
Average total value	£50·88	100

Switzerland: Special Exports.—Articles.

Principal Articles	Average Value in mln. £, 1901–1905	Percentages
1. Silk manufactures	6·35	17·1
2. Watches and clocks	4·85	13·1
3. Ribbons, embroidery, and lace	4·55	12·3
4. Raw silk	3·24	8·7
5. Cotton yarns and tissues	2·10	5·7
6. Machinery and locomotives	1·93	5·2
7. Cheese	1·72	4·6
8. Condensed milk	1·22	3·3
Average total value	£37·11	100

Switzerland: Special Imports.—Countries.

Principal Countries of Origin	Average Value in mln. £, 1901–1905	Percentages
1. Germany	14·66	28·8
2. France	11·75	23·1
3. Italy	7·05	13·9
4. Austria-Hungary	3·22	6·3
5. Russia	2·79	5·5
6. United States	2·33	4·6
7. United Kingdom	2·28	4·5
8. Belgium	1·08	2·1
Average total value	£50·88	100

Switzerland: Special Exports.—Countries.

Principal Destinations	Average Value in mln. £, 1901–1905	Percentages
1. Germany	8·63	23·3
2. United Kingdom	7·25	19·5
3. France	5·31	14·3
4. United States	4·36	11·8
5. Italy	2·22	6·0
6. Austria-Hungary	2·06	5·6
7. Russia	1·06	2·9
8. British India	0·62	1·7
Average total value	£37·11	100

[1] Except iron and coal, but including diamonds.

DENMARK: GENERAL IMPORTS.—ARTICLES.

Principal Articles	Average Value in mln. £, 1901-1905	Percentages
1. Grain, all kinds	3·37	10·6
2. Butter	2·17	6·8
3. Coal, coke, &c.	2·03	6·3
4. Iron and steel manufactures	1·98	6·2
5. Oil-cake	1·98	6·2
Average total value	£32·00	100

DENMARK: SPECIAL EXPORTS.—ARTICLES.

Principal Articles	Average Value in mln. £, 1901-1905	Percentages
1. Butter	8·07[1]	42·5
2. Meat, all kinds	4·84	25·5
3. Animals	1·76	9·3
4. Eggs	1·37	7·2
5. Hides and skins, raw	0·46	2·4
Average total value	£19·01	100

DENMARK: GENERAL IMPORTS.—COUNTRIES.

Principal Countries of Origin	Average Value in mln. £, 1901-1905	Percentages
1. Germany	10·28	32·1
2. United Kingdom	5·12	16·0
3. United States	4·60	14·4
4. Russia	4·02	12·6
5. Sweden	3·03	9·5
6. France	0·82	2·6
Average total value	£32·00	100

DENMARK: GENERAL EXPORTS.—COUNTRIES.

Principal Destinations	Average Value in mln. £, 1901-1905	Percentages
1. United Kingdom	14·73	58·3
2. Germany	4·81	19·0
3. Sweden	2·18	8·6
4. Russia	1·25	4·9
5. United States	0·77	3·0
6. Norway	0·74	2·9
Average total value	£25·28	100

NORWAY: GENERAL IMPORTS.—ARTICLES.

Principal Articles	Average Value in mln. £, 1901-1905	Percentages
1. Corn and meal	2·88	17·6
2. Iron and steel, and manufactures thereof	1·56	9·5
3. Coal, coke, &c.	1·34	8·2
4. Woollen yarns and tissues	0·76	4·6
5. Cotton yarns and tissues	0·58	3·5
Average total value	£16·39	100

NORWAY: SPECIAL EXPORTS.—ARTICLES.

Principal Articles	Average Value in mln. £, 1901-1905	Percentages
1. Fish, all kinds	2·62	27·5
Cod, dried or split	*1·35*	*14·2*
2. Wood, excluding pulp	2·10	22·0
3. Wood pulp	1·37	14·4
4. Train oil	0·33	3·4
5. Packing paper	0·32	3·3
6. Sulphur	3·15	1·5
Average total value	£9·54	100

NORWAY: GENERAL IMPORTS.—COUNTRIES.

Principal Countries of Origin	Average Value in mln. £, 1901-1905	Percentages
1. Germany	4·51	27·5
2. United Kingdom	4·18	25·5
3. Russia and Finland	1·76	10·7
4. Sweden	1·69	10·3
5. Denmark	1·02	6·2
6. Holland	0·77	4·7
Average total value	£16·39	100

NORWAY: SPECIAL EXPORTS.—COUNTRIES.

Principal Destinations	Average Value in mln. £, 1901-1905	Percentages
1. United Kingdom	4·25	44·5
2. Germany	1·42	14·9
3. Sweden	0·84	8·8
4. Holland	0·82	8·6
5. Spain	0·65	6·9
6. France	0·47	4·9
Average total value	£9·54	100

SWEDEN: GENERAL IMPORTS.[2]—ARTICLES.

Principal Articles	Average Value in mln. £, 1901-1905	Percentages
1. Coal and coke	3·26	11·1
2. Wheat, rye, and meal of both	2·19	7·5
Wheat	*1·45*	*4·9*
3. Iron and steel, and manufactures thereof	1·47	5·0
4. Coffee	1·21	4·1
5. Machinery, including locomotives	1·14	3·9
6. Woollen yarns and tissues	1·13	3·9
7. Skins, dressed and undressed	0·86	2·9
Average total value	£29·31	100

SWEDEN: SPECIAL EXPORTS.[2]—ARTICLES.

Principal Articles	Average Value in mln. £, 1901-1905	Percentages
1. Wood, excluding pulp	8·12	35·6
2. Iron, pig, bar, blooms, &c.	2·10	9·2
3. Butter	2·04	8·9
4. Wood pulp	1·88	8·2
5. Iron ore	1·14	5·0
6. Paper	1·07	4·7
7. Machinery	0·81	3·6
8. Iron and steel wares, including wire and plates	0·68	3·0
9. Lucifer matches	0·45	2·0
10. Fish, fresh and salted	0·22	1·0
Average total value	£22·80	100

[1] About 3 per cent. of this butter was in hermetically sealed boxes, and the average value of this butter in 1905 was about 1*s*. 2·3*d*. per lb., as against 11·7*d*. per lb. for the remainder of the butter.

[2] Three countries—the United Kingdom, Germany, and Denmark—furnished in 1901–5 more than three-fourths of the value of Swedish imports and took more than two-thirds of the value of Swedish exports. The United Kingdom came first among the recipients of the exports, taking more than 37 per cent., Germany coming next with 17 per cent. In supplying the imports, Germany took the lead with nearly 39 per cent. of the total, the United Kingdom coming next with rather more than 26 per cent.

Austria-Hungary: Special Imports. Articles.

Principal Articles	Average Value in mln. £, 1901–1905	Percentages
1. Raw cotton	7·67	9·7
2. Raw wool	4·84	6·1
3. Coal and coke	4·30	5·5
4. Hides and skins	2·20	2·8
5. Tobacco	2·16	2·7
6. Leather and leather wares	2·10	2·7
7. Machinery, incl. locomotives	2·09	2·7
8. Flax, hemp, jute	2·04	2·6
9. Books, &c.	1·98	2·5
Average total value	£78·70	100

Austria-Hungary: Special Exports. Articles.

Principal Articles	Average Value in mln. £, 1901–1905	Percentages
1. Wood and manufactures	11·59	13·6
2. Sugar and molasses	6·86	8·0
3. Animals, horses, &c.	6·26	7·3
4. Eggs	4·32	5·1
5. Lignite and coal	3·41	4·0
6. Barley and wheat	2·83	3·3
7. Jewellery and fancy wares	2·22	2·6
8. Glasswares	2·22	2·6
9. Woollen manufactures	2·19	2·6
10. Leather manufactures	2·12	2·5
Average total value	£85·51	100

Austria-Hungary: Special Imports. Countries.

Principal Countries of Origin	Average Value in mln. £, 1901–1905	Percentages
1. Germany	29·62	37·6
2. United States	6·78	8·6
3. United Kingdom	6·22	7·9
4. Russia	4·62	5·9
5. British East Indies	4·60	5·8
6. Italy	4·56	5·8
7. France	2·64	3·4
8. Servia	2·34	3·0
Average total value	£78·70	100

Austria-Hungary: Special Exports. Countries.

Principal Destinations	Average Value in mln. £, 1901–1905	Percentages
1. Germany	43·40	50·8
2. United Kingdom	8·06	9·4
3. Italy	6·29	7·4
4. Turkey	3·35	3·9
5. Switzerland	3·23	3·8
6. Russia	3·04	3·6
7. Roumania	2·76	3·2
8. France	2·70	3·2
Average total value	£85·51	100

Italy: Special Imports.[1]—Articles.

Principal Articles	Average Value in mln. £, 1901–1905	Percentages
1. Wheat	7·67	10·3
2. Cotton, raw	7·38	9·9
3. Cocoons and raw and thrown silk	7·30	9·8
4. Coal and coke	5·97	8·0
5. Machinery and locomotives	3·08	4·1
6. Timber for building	2·55	3·4
7. Wool, raw and waste	2·30	3·1
8. Fish	1·75	2·3
9. Hides, raw and dried	1·71	2·3
10. Horses, mules, asses	1·28	1·7
Average total value	£74·68	100

Italy: Special Exports.[1]—Articles.

Principal Articles	Average Value in mln. £, 1901–1905	Percentages
1. Cocoons and raw and undyed thrown silk	19·05	30·9
2. Silks and half-silks	2·78	4·5
3. Cotton manufactures	2·75	4·5
4. Wine	1·89	3·1
5. Eggs	1·84	3·0
6. Sulphur	1·73	2·8
7. Hemp and flax	1·62	2·6
8. Olive oil	1·57	2·6
9. Butter and cheese	1·47	2·4
10. Coral manufactures	1·06	1·7
11. Oranges and lemons	1·05	1·7
Average total value	£61·54	100

Italy: Special Imports.[1]—Countries.

Principal Countries of Origin	Average Value in mln. £, 1901–1905	Percentages
1. United Kingdom	12·13	16·2
2. Germany	9·67	12·9
3. United States	9·08	12·2
4. France	7·84	10·5
5. Austria-Hungary	7·33	9·8
6. Russia	7·24	9·7
7. British East Indies	3·83	5·1
8. China	3·01	4·0
Average total value	£74·68	100

Italy: Special Exports.[1]—Countries.

Principal Destination	Average Value in mln. £, 1901–1905	Percentages
1. Switzerland	10·74	17·5
2. Germany	9·14	14·9
3. United States	7·20	11·7
4. France	7·12	11·6
5. Austria-Hungary	5·54	9·0
6. United Kingdom	5·52	9·0
7. Argentine Republic	3·49	5·7
8. Turkey in Europe	1·84	3·0
Average total value	£61·54	100

[1] Including silver bullion.

SPAIN: GENERAL IMPORTS.[1]—ARTICLES.

Principal Articles	Average Value in mln. £, 1901–1905	Percentages
1. Raw cotton	4·07	10·4
2. Coal and coke	2·84	7·3
3. Wheat	2·65	6·8
4. Machinery	2·39	6·1
5. Timber and building materials	2·16	5·5
6. Chemicals	2·08	5·3
7. Iron and steel, wrought and unwrought	1·22	3·1
8. Fish, salted	1·19	3·0
Average total value	£39·07	100

SPAIN: GENERAL EXPORTS.[1]—ARTICLES.

Principal Articles	Average Value in mln. £, 1901–1905	Percentages
1. Iron ore	4·56	12·6
2. Lead in bars, plates, &c.	2·80	7·7
3. Wine	2·68	7·4
4. Oranges	2·13	5·9
5. Olive oil	1·73	4·8
6. Copper ore	1·57	4·3
7. Cork	1·51	4·2
8. Cotton manufactures	1·46	4·0
9. Copper regulus	1·42	3·9
10. Animals	0·97	2·7
Average total value	£36·30	100

SPAIN: GENERAL IMPORTS.[1]—COUNTRIES.

Principal Countries of Origin	Average Value in mln. £, 1901–1905	Percentages
1. United Kingdom	7·31	18·7
2. France	6·09	15·6
3. United States	4·61	11·8
4. Germany	3·54	9·1
5. Russia, excluding Finland	2·12	5·4
6. Portugal	1·70	4·4
7. British E. Indies	1·67	4·3
8. Belgium	1·42	3·6
9. Argentine Republic	1·12	2·9
Average total value	£39·07	100

SPAIN: GENERAL EXPORTS.[1]—COUNTRIES.

Principal Destinations	Average Value in mln. £, 1901–1905	Percentages
1. United Kingdom	12·22	33·7
2. France	7·95	21·9
3. Cuba, Puerto Rico and Philippines	3·33	9·2
4. Holland	1·75[2]	4·8
5. Portugal	1·71	4·7
6. Germany	1·63	4·5
7. Italy	1·55	4·3
8. Belgium	1·06	2·9
9. United States	1·01	2·8
Average total value	£36·30	100

GREECE: SPECIAL IMPORTS.[1]—ARTICLES.

Principal Articles	Average Value in mln. £, 1901–1905	Percentages
1. Grain	1·31	23·6
2. Cotton manufactures	0·40	7·2
3. Coal	0·30	5·4
4. Animals	0·21	3·8
5. Wood, building	0·21	3·8
6. Fish, fresh and preserved	0·20	3·6
7. Woollen manufactures	0·18	3·2
8. Hides and skins	0·16	2·9
9. Paper, manufacture of	0·12	2·2
10. Coffee	0·12	2·2
Average total value	£5·55	100

GREECE: SPECIAL EXPORTS.[1]—ARTICLES.

Principal Articles	Average Value in mln. £, 1901–1905	Percentages
1. Currants	1·20	34·6
2. Silver, lead ore	0·33	9·5
3. Wine	0·25	7·2
4. Tobacco leaf	0·22	6·3
5. Olive oil	0·16	4·6
6. Manganese iron ore	0·14	4·0
7. Figs	0·13	3·7
8. Valonia	0·09	2·6
9. Zinc ore	0·08	2·3
10. Hides, fresh or dried	0·05	1·4
11. Olives	0·05	1·4
Average total value	£3·47	100

GREECE: SPECIAL IMPORTS.[1]—COUNTRIES.

Principal Countries of Origin	Average Value in mln. £, 1901–1905	Percentages
1. Russia	1·18	21·3
2. United Kingdom	1·17	21·1
3. Austria-Hungary	0·78	14·0
4. Turkey	0·56	10·1
5. Germany	0·49	8·8
6. France	0·46	8·3
7. Italy	0·24	4·3
8. Belgium	0·11	2·0
9. United States	0·10	1·8
Average total value	£5·55	100

GREECE: SPECIAL EXPORTS.[1]—COUNTRIES.

Principal Destinations	Average Value in mln. £, 1901–1905	Percentages
1. United Kingdom	0·93	26·8
2. Austria-Hungary	0·37	10·7
3. France	0·36	10·4
4. Holland	0·29	8·4
5. Germany	0·26	7·5
6. Turkey	0·23	6·6
7. Belgium	0·22	6·3
8. United States	0·20	5·8
9. Egypt	0·20	5·8
Average total value	£3·47	100

[1] Including bullion and specie.

[2] Probably including a large quantity of iron ore in transit to Germany, which in 1905 imported from Spain iron ore valued in Germany at £2·77 millions.

RUSSIA: SPECIAL IMPORTS.—ARTICLES.

Principal Articles	Average Value in mln. £, 1901–1905	Percentages
1. Raw cotton	8·87	13·3
2. Tea	5·10	7·6
3. Metal wares	3·11	4·7
4. Coal and coke	2·53	3·8
5. India-rubber and gutta-percha	2·19	3·3
6. Engines and machinery	2·11	3·2
7. Raw wool	2·09	3·1
8. Fish, salted or dried	1·58	2·3
Average total value	£66·73	100

RUSSIA: SPECIAL EXPORTS.—ARTICLES.

Principal Articles	Average Value in mln. £, 1901–1905	Percentages
1. Corn, &c., total	49·04	49·4
2. *Wheat*	*22·02*	*22·2*
3. *Barley*	*7·88*	*7·9*
4. Wood, all sorts	6·95	7·0
5. Flax, raw and tow	6·56	6·6
6. Eggs	5·07	5·1
7. Oil, petroleum	5·00	5·0
8. Butter (exc. margarine)	3·13	3·1
9. Sugar, total	2·13	2·1
10. Cotton manufactures	2·04	2·1
Average total value	£99·37	100

RUSSIA: SPECIAL IMPORTS.—COUNTRIES.

Principal Countries of Origin	Average Value in mln. £, 1901–1905	Percentages
1. Germany	23·84	35·7
2. United Kingdom	10·91	16·3
3. China	5·67	8·5
4. United States	5·10	7·6
5. France	2·85	4·3
6. Persia	2·57	3·9
7. Austria-Hungary	2·47	3·7
8. Egypt	1·45	2·2
Average total value	£66·73	100

RUSSIA: SPECIAL EXPORTS.—COUNTRIES.

Principal Destinations	Average Value in mln. £, 1901–1905	Percentages
1. Germany	23·32	23·5
2. United Kingdom	22·02	22·2
3. Holland	10·87	10·9
4. France	6·72	6·8
5. Italy	5·46	5·5
6. Finland	4·40	4·4
7. Austria-Hungary	4·09	4·1
8. Belgium	3·83	3·9
Average total value	£99·37	100

ROUMANIA: GENERAL IMPORTS.—ARTICLES.

Principal Articles	Average Value in mln. £, 1901–1905	Percentages
1. Cotton tissues	1·59	13·3
2. Woollen tissues	1·12	9·4
3. Machinery	0·82	6·9
4. Cotton yarns, undyed	0·38	3·2
5. Silk and mixed tissues	0·20	1·7
6. Gutta-percha wares, &c.	0·18	1·5
Average total value	£11·96	100

ROUMANIA: GENERAL EXPORTS.—ARTICLES.

Principal Articles	Average Value in mln. £, 1901–1905	Percentages
1. Wheat	5·30	36·7
2. Maize	2·58	17·9
3. Barley (including malt)	1·21	8·4
4. Oil seeds	0·90	6·2
5. Rye	0·53	3·7
6. Wood for building	0·47	3·3
Average total value	£14·43	100

ROUMANIA: GENERAL IMPORTS.—COUNTRIES.

Principal Countries of Origin	Average Value in mln. £, 1901–1905	Percentages
1. Germany	3·41	28·5
2. Austria-Hungary	3·24	27·1
3. United Kingdom	2·01	16·8
4. France	0·69	5·8
5. Italy	0·69	5·8
6. Turkey, incl. Egypt	0·43	3·6
Average total value	£11·96	100

ROUMANIA: GENERAL EXPORTS.—COUNTRIES.

Principal Destinations	Average Value in mln. £, 1901–1905	Percentages
1. Belgium	6·14	42·6
2. Austria-Hungary	1·89	13·1
3. Holland	1·38	9·6
4. United Kingdom	1·23	8·5
5. Italy	1·07	7·4
6. Germany	1·03	7·1
7. France	0·47	3·3
Average total value	£14·43	100

INDIA: GENERAL IMPORTS[1] BY SEA.—ARTICLES.

Principal Articles (excluding government stores)	Average Value in mln. £, 1901–1905	Percentages
1. Cotton manufs.	23·31	29·1
2. *Cotton tissues*	*21·58*	*26·9*
3. *Cotton twist and yarn*	*1·73*	*2·2*
4. Metals	5·68	7·1
5. Sugar	4·20	5·2
6. Machinery & millwork	2·42	3·0
7. Mineral oils	2·17	2·7
8. Woollen manufs.	1·47	1·8
Average total value: Private merchandise	£80·07	100

INDIA: GENERAL EXPORTS[1] BY SEA.—ARTICLES.

Principal Articles	Average Value in mln. £, 1901–1905	Percentages
1. Raw cotton	12·31	12·7
2. Rice	12·02	12·4
3. Seeds	9·49	9·8
4. Jute, raw	8·50	8·8
5. Jute manufs.	6·61	6·8
6. Hides and skins	6·57	6·8
7. Cotton twist and yarn	6·52	6·7
8. Opium	6·28	6·5
9. Wheat	6·04	6·2
Average total value	£96·73	100

INDIA: GENERAL IMPORTS[2] BY SEA.—COUNTRIES.

Principal Countries of Origin	Average Value in mln. £, 1901–1905	Percentages
1. United Kingdom	49·73	62·1
2. Straits Settlements	2·49	3·1
3. Belgium	2·32	2·9
4. Austria-Hungary	2·24	2·8
5. Germany	2·16	2·7
6. Mauritius	1·52	1·9
7. Russia	1·38	1·7
8. France	1·09	1·4
Average total value	£80·07	100

INDIA; GENERAL EXPORTS[2] BY SEA.—COUNTRIES.

Principal Destinations	Average Value in mln. £, 1901–1905	Percentages
1. United Kingdom	30·61	31·6
2. China	12·37	12·8
3. Germany	8·55	8·8
4. United States	6·48	6·7
5. Straits Settlements	6·29	6·5
6. France	6·27	6·5
7. Japan	5·66	5·9
8. Belgium	4·30	4·4
Average total value	£96·73	100

CEYLON: IMPORTS.[3]—ARTICLES.

Principal Articles	Average Value in mln. £, 1901–1905	Percentages
1. Rice and paddy	2·49	32·8
2. Coal and coke, including bunker coal[4]	·73	9·6
3. Specie and bullion	·71	9·4
4. Cotton manufactures	·44	5·7
5. Grain, other than rice, and flour	·16	2·1
Average total value	£7·60	100

CEYLON: EXPORTS.[3]—ARTICLES.

Principal Articles	Average Value in mln. £, 1901–1905	Percentages
1. Tea	3·69	54·8
2. Coco-nut oil	·64	9·4
3. Plumbago	·53	7·9
4. Copra	·39	5·8
5. Dried coco-nut	·20	2·9
6. Cocoa	·16	2·4
7. Cinnamon	·16	2·4
Average total value	£6·73	100

CEYLON: IMPORTS.[3]—COUNTRIES.

Principal Countries of Origin	Average Value in mln. £, 1901–1905	Percentages
1. India	4·29	56·4
2. United Kingdom	1·97	25·9
3. Australasia	·28	3·7
4. Germany	·14	1·9
5. Foreign Poss. in India	·13	1·7
6. Maldive Isls.	·12	1·6
Average total value	£7·60	100

CEYLON: EXPORTS.[3]—COUNTRIES.

Principal Destinations	Average Value in mln. £, 1901–1905	Percentages
1. United Kingdom	3·51	52·2
2. India	·55	8·2
3. Australasia	·55	8·1
4. United States	·54	8·0
5. Germany	·46	6·8
6. Russia	·32	4·8
Average total value	£6·73	100

[1] Exclusive of bullion and specie. Since 1898 India has virtually had a gold standard, the rupee exchanging at the rate of 15 to the £.
[2] Exclusive of Government imports and exports, except in the case of bullion and specie.
[3] Including bullion and specie. [4] Including, in 1905, coal for Government purposes.

CHINA [1]: IMPORTS.—ARTICLES.

Principal Articles	Average Value in mln. £, 1901–1905	Percentages
1. Cotton yarns and tissues	18·57	38·6
2. Opium	5·06	10·5
3. Metals, all kinds	2·95	6·1
4. Sugar and candy	2·55	5·3
5. Oil	2·47	5·1
6. Rice	1·51	3·1
7. Coal	1·06	2·2
8. Fish, &c.	0·77	1·6
Average total value	£48·09	100

CHINA [1]: EXPORTS.—ARTICLES.

Principal Articles	Average Value in mln. £, 1901–1905	Percentages
1. Silk and manufactures of silk	10·12	33·8
2. *Raw and filature silk*	*8·41*	*28·1*
3. *Silk piece-goods*	*1·54*	*5·1*
4. Tea, total	3·45	11·5
5. Cotton, raw	1·89	6·3
6. Beans and bean cake	1·56	5·2
7. Skins, &c.	0·90	3·0
Average total value	£29·97	100

CHINA [1]: IMPORTS.—COUNTRIES.

Principal Countries of Origin	Average Value in mln. £ 1901–1905	Percentages
1. Hong Kong [2]	19·10	39·7
2. United Kingdom	8·25	17·2
3. Japan and Formosa	6·45	13·4
4. United States	5·29	11·0
5. India	4·55	9·5
6. Europe, Continent, excluding Russia	3·18	6·6
7. Singapore and Straits Settlements	0·56	1·2
Average total value	£48·09	100

CHINA [1]: EXPORTS.—COUNTRIES.

Principal Destinations	Average Value in mln. £, 1901–1905	Percentages
1. Hong Kong [2]	11·49	38·3
2. Europe, Continent, excluding Russia	5·14	17·2
3. Japan and Formosa	4·18	13·9
4. United Kingdom	1·76	5·9
5. Macao	0·69	2·3
6. Russia in Europe	0·54	1·8
7. Russia in Asia	0·48	1·6
8. Singapore, &c.	0·47	1·6
Average total value	£29·97	100

JAPAN: IMPORTS.—ARTICLES.

Principal Articles	Average Value in mln. £, 1901–1905	Percentages
1. Raw cotton, ginned	7·76	21·6
2. Rice	3·84	10·7
3. Metals, and manufactures of metals	3·06	8·5
4. Sugar	2·14	6·0
5. Cotton yarns and tissues	1·60	4·5
6. Oil, kerosene	1·52	4·2
7. Machinery, including locomotives	1·28	3·6
8. Woollens	1·17	3·3
9. Oil cakes	0·91	2·5
Average total value	£35·92	100

JAPAN: EXPORTS.—ARTICLES.

Principal Articles	Average Value in mln. £, 1901–1905	Percentages
1. Silk, raw and waste	8·31	27·5
2. Cotton yarns and tissues	3·61	11·9
3. Silk tissues	3·46	11·4
4. Tea	1·70	5·6
5. Coal	1·68	5·6
6. Copper	1·36	4·5
7. Matches	0·88	2·9
8. Rice	0·67	2·2
9. Camphor	0·54	1·8
10. Matting	0·53	1·8
11. Fish and shell-fish	0·48	1·6
Average total value	£30·24	100

JAPAN: IMPORTS.—COUNTRIES.

Principal Countries of Origin	Average Value in mln. £, 1901–1905	Percentages
1. India, Straits Settlements and Siam	7·03	19·6
2. United Kingdom	6·97	19·4
3. United States	6·13	17·1
4. China	4·97	13·8
5. Germany	3·06	8·5
6. French India	1·07	3·1
7. Korea	0·79	2·2
Average total value	£35·92	100

JAPAN: EXPORTS.—COUNTRIES.

Principal Destinations	Average Value in mln. £, 1901–1905	Percentages
1. United States	8·83	29·2
2. China	7·10	23·5
3. Hong Kong	3·13	10·4
4. France	3·05	10·1
5. Korea	1·61	5·3
6. United Kingdom	1·53	5·1
7. India, Straits Settlements and Siam	1·31	4·3
Average total value	£30·24	100

[1] Exclusive of Hong Kong.
[2] Obviously the large place assigned to Hong Kong in both tables makes the real origin and destination of the goods in a large measure uncertain.

CANADA: GENERAL IMPORTS.[1]—ARTICLES.

Principal Articles	Average Value in mln. £, 1901–1905[2]	Percentages
1. Iron and steel, all kinds	8·46	16·2
2. Coal	3·73	7·1
3. Woollen manufactures	2·90	5·5
4. Cotton manufactures	1·76	3·4
5. Sugar	1·72	3·3
6. Bullion and specie	1·67	3·2
7. Wood and manufactures of wood	1·62	3·1
8. Cotton, raw and waste	1·35	2·6
Average total value	£52·37	100

CANADA: GENERAL EXPORTS.[1]—ARTICLES.

Principal Articles	Average Value in mln. £, 1901–1905	Percentages
1. Timber	6·27	13·7
2. Wheat	4·95	10·8
3. Cheese	4·67	10·2
4. Gold, copper, and copper ore	4·35	9·5
5. Animals	2·80	6·1
6. Bacon and hams	2·72	6·0
7. Butter	1·25	2·7
8. Canned lobster and salmon	1·19	2·6
9. Dried fish	0·65	1·4
Average total value	£45·67	100

CANADA: SPECIAL IMPORTS.[1]—COUNTRIES.

Principal Countries of Origin	Average Value in mln. £, 1901–1905	Percentages
1. United States	30·75	60·3
2. United Kingdom	12·31	24·1
3. Germany	1·85	3·6
4. France	1·41	2·8
5. West Indies	0·76	1·5
6. East Indies	0·54	1·1
7. Belgium	0·50	1·0
8. Japan	0·35	0·7
Average total value	£50·99	100

CANADA: GENERAL EXPORTS.[1]—COUNTRIES.

Principal Destinations	Average Value in mln. £, 1901–1905	Percentages
1. United Kingdom	24·72	54·1
2. United States	16·09	35·2
3. Australasia	0·62	1·4
4. Newfoundland	0·60	1·3
5. South America	0·54	1·2
6. Africa	0·49	1·1
7. West Indies	0·46	1·0
8. Germany	0·40	0·9
Average total value	£45·67	100

ARGENTINE REPUBLIC: SPECIAL IMPORTS.[3] ARTICLES.

Principal Articles	Average Value in mln. £, 1901–1905	Percentages
1. Iron and steel, excl. railway material	3·77	12·7
2. Cotton manufactures	2·93	9·9
3. Wood & manufactures	2·08	7·0
4. Coal and coke	1·63	5·5
5. Railway materials	1·37	4·6
6. Sackcloth	1·15	3·9
7. Wine	1·05	3·5
8. Woollen tissues	0·70	2·3
Average total value	£29·63	100

ARGENTINE REPUBLIC: SPECIAL EXPORTS.[3] ARTICLES.

Principal Articles	Average Value in mln. £, 1901–1905	Percentages
1. Wool, raw	10·14	21·9
2. Wheat	9·56	20·7
3. Maize	6·64	14·4
4. Hides, raw	4·77	10·3
5. Linseed	4·41	9·5
6. Beef, chilled and salted	2·28	4·9
7. Frozen mutton	1·24	2·7
8. Grease and tallow	0·97	2·1
Average total value	£46·21	100

ARGENTINE REPUBLIC: SPECIAL IMPORTS.[3] COUNTRIES.

Principal Countries of Origin	Average Value in mln. £, 1901–1905	Percentages
1. United Kingdom	10·05	33·9
2. Germany	4·04	13·6
3. United States	3·96	13·4
4. Italy	3·25	11·0
5. France	2·81	9·5
6. Belgium	1·50	5·1
7. Brazil	1·03	3·5
Average total value	£29·63	100

ARGENTINE REPUBLIC: SPECIAL EXPORTS.[3] COUNTRIES.

Principal Destinations	Average Value in mln. £, 1901–1905	Percentages
1. United Kingdom	7·28	15·8
2. France	6·43	13·9
3. Germany	5·51	11·9
4. Belgium	3·43	7·4
5. United States	2·14	4·6
6. Brazil	2·00	4·3
7. Italy	0·96	2·1
Average total value	£46·21	100

[1] Including bullion and specie. [2] Five years ending June 30, 1906. [3] Including silver bullion.

UNITED STATES: GENERAL IMPORTS.[1]—ARTICLES.

Principal Articles	Average Value in mln. £, 1901-1905 [2]	Percentages
1. Sugar and molasses	15·91	7·3
2. Coffee	14·90	6·8
3. Chemicals	13·61	6·2
4. Hides and skins (excluding furs)	13·20	6·0
5. Cotton manufactures	10·77	4·9
6. Silk, raw, waste	10·58	4·8
7. Flax, hemp and jute manufactures	8·76	4·0
8. Rubber, crude	8·18	3·7
9. Flax, jute, &c., raw	7·55	3·4
10. Silk manufactures	6·92	3·2
11. Jewellery & precious stones	6·83	3·1
12. Iron & steel, & manufactures thereof	6·60	3·0
Average total value	£219·34	100

UNITED STATES: SPECIAL EXPORTS.[1]—ARTICLES.

Principal Articles	Average Value in mln. £, 1901-1905	Percentages
1. Raw cotton	73·28	23·8
2. Wheat and wheat flour	24·03	7·8
3. *Wheat*	*11·22*	*3·6*
4. *Wheat flour*	*12·82*	*4·2*
5. Iron and steel wares	12·84	4·2
6. Wood and manufactures of wood	12·42	4·0
7. Machinery	12·28	4·0
8. Copper, ingots, bar, &c.	12·10	3·9
9. Refined mineral oil	11·20	3·6
10. Lard	10·71	3·5
11. Bacon and hams	10·68	3·5
12. Animals	9·31	3·0
13. Cotton manufactures	7·89	2·6
Average total value	£308·03	100

UNITED STATES: GENERAL IMPORTS.—COUNTRIES.

Principal Countries of Origin	Average Value in mln. £, 1901–1905	Percentages
1. United Kingdom	37·81	17·2
2. Germany	24·35	11·1
3. France	18·86	8·6
4. Brazil	16·95	7·7
5. Cuba	14·41	6·6
6. British N. America	12·10	5·5
7. British East Indies	11·20	5·0
8. Japan	9·69	4·4
9. Mexico	9·28	4·2
10. Italy	7·47	3·4
11. China, excluding Hong Kong	5·56	2·5
12. Belgium	4·84	2·2
13. Holland	4·62	2·1
Average total value	£219·34	100

UNITED STATES: SPECIAL EXPORTS.—COUNTRIES.

Principal Destinations	Average Value in mln. £, 1901–1905	Percentages
1. United Kingdom	111·92	36·3
2. Germany	41·55	13·5
3. British N. America	26·19	8·5
4. France	16·60	5·4
5. Holland	16·34	5·3
6. Mexico	9·46	3·1
7. Belgium	9·18	3·0
8. Italy	7·78	2·5
9. Japan	6·49	2·1
10. Cuba	6·41	2·1
11. China	6·38	2·1
12. Australia and New Zealand	5·97	1·9
13. British Africa	4·66	1·5
Average total value	£308·03	100

UNITED STATES.

Average total value in million £ of	Years ended June 30	
	1891–1895	1901–1905
	£	£
Total imports (excluding bullion and specie)	163·57	219·34
Total exports (excluding bullion and specie, but including articles of foreign origin)	185·92	313·55
Average excess of imports of bullion and specie	—	—
Average excess of exports of bullion and specie	12·08	9·38

[1] Including bullion and specie. [2] Five years ending June 30, 1906.

AUSTRALIAN COMMONWEALTH.

It is stated in the original Commonwealth Trade Returns for 1904 that 'prior to September 1st 1903 it was the practice in most of the States for goods of local produce despatched from one Australian State to another for transhipment beyond the Commonwealth to be recorded only as inter-State transfers from the original State, no notice being taken of the oversea export.' No reliable estimate of the values of these transhipments prior to September 1st 1903 can be given, but in 1904 they amounted to £3,655,128. For this reason no absolute data as to the external commerce of the Commonwealth before 1904 are given, but the figures showing the relative distribution of the trade from 1861 are reproduced below from pp. 258 and 259 of the *Statistical Account of Australia and New Zealand*, 1903–4, by T. A. Coghlan.

Australian Commonwealth : Imports.[1]
Articles.

Principal Articles	Average Value in mln. £, 1904–1905	Percentages
1. Textiles [2]	8·91	23·6
2. Iron and steel [3]	2·46	6·5
3. Machinery	1·74	4·6
4. Bullion and specie	1·37	3·6
5. Wood	1·14	3·0
6. Tea	0·80	2·1
7. Spirits	0·74	2·0
8. Tobacco	0·54	1·4
Average total value [4]	£37·68	100

Australian Commonwealth : Exports.[1]
Articles.

Principal Articles	Average Value in mln. £, 1904–1905	Percentages
1. Wool	18·48	32·3
2. Bullion and specie	15·78	27·6
3. Wheat	4·73	8·3
4. Butter	2·41	4·2
5. Copper	1·82	3·1
6. Meat, not tinned	1·63	2·9
7. Skins	1·59	2·8
8. Coal	0·82	1·4
Average total value	£57·16	100

Australian Commonwealth ; Imports.
Countries.

Principal Countries of Origin	Average Value in mln. £, 1904–1905	Percentages
1. United Kingdom	22·77	60·4
2. United States	4·54	12·0
3. Germany	2·65	7·0
4. New Zealand	2·10	5·8
5. India	1·17	3·0
6. Ceylon	0·67	1·8
7. Belgium	0·60	1·6
8. France	0·42	1·1
Average total value [5]	£37·68	100

Australian Commonwealth : Exports.
Countries.

Principal Destinations	Average Value in mln. £, 1904–1905	Percentages
1. United Kingdom	27·13	47·5
2. Ceylon	5·52	9·6
3. France	4·79	8·4
4. Germany	3·82	6·6
5. India	3·65	5·5
6. Belgium	2·76	4·8
7. United States	1·63	2·9
8. Cape Colony	1·58	2·7
Average total value	£57·16	100

[1] Including bullion and specie. [2] Including apparel, blankets, drapery, and haberdashery.
[3] Including tin-plate and wire.
[4] In recent years bags, paper, and railway material have also generally been imported to the value of more than £500,000.
[5] In recent years leather, silver-ore, silver-lead, bullion, tallow and tin have also generally been exported to the value of above £500,000.

Origin and Destination of Commodities.

Years	Imports from— United Kingdom	Imports from— British Possessions	Imports from— Foreign Countries	Exports to— United Kingdom	Exports to— British Possessions	Exports to— Foreign Countries
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
1861–65	69·80	13·28	16·92	59·48	38·53	1·99
1866–70	64·94	19·43	15·63	68·25	30·12	1·63
1871–75	69·34	18·28	12·38	75·63	21·07	3·30
1876–80	72·30	14·89	12·81	74·20	22·00	3·80
1881–85	73·34	12·88	13·78	74·91	15·83	9·26
1886–90	70·98	12·34	16·68	76·57	8·81	14·62
1891–95	71·27	11·64	17·09	70·66	8·37	20·97
1896–1900	64·58	11·08	24·34	59·86	12·41	27·73
1901–1904	57·86	12·45	29·69	46·64	27·57	25·79

New Zealand: Imports.[1]—Articles.

Principal Articles	Average Value in mln. £, 1901–1905	Percentages
1. Iron and ironmongery	0·84	6·7
2. Machinery . . .	0·72	5·8
3. Apparel and slops .	0·56	4·5
4. Cotton piece-goods .	0·52	4·2
5. Drapery . . .	0·48	3·9
6. Specie	0·46	3·7
7. Sugar	0·45	3·6
8. Woollen piece-goods .	0·39	3·1
9. Stationery and books .	0·33	2·7
Average total value .	£12·41	100

New Zealand: Exports.[1]—Articles.

Principal Articles	Average Value in mln. £, 1901–1905	Percentages
1. Wool	4·23	29·4
2. Meat, frozen . .	2·73	19·0
3. Gold bullion . .	1·97	13·7
4. Butter . . .	1·24	8·6
5. Kauri gum . .	0·72	5·0
6. Hemp (phormium) .	0·55	3·8
7. Oats	0·47	3·3
8. Skins	0·46	3·2
9. Tallow, oleomargarine	0·43	3·0
Average total value .	£14·39	100

New Zealand: Imports.[1]—Countries.

Principal Countries of Origin	Average Value in mln. £, 1901–1905	Percentages
1. United Kingdom .	7·41	59·7
2. United States . .	1·43	11·5
3. New South Wales .	1·11	8·9
4. Victoria . . .	0·69	5·6
5. All Brit. Possessions .	2·92	23·5
6. All Foreign Countries	2·09	16·8
Average total value . .	£12·41	100

New Zealand: Exports.[1]—Countries.

Principal Destinations	Average Value in mln. £, 1901–1905	Percentages
1. United Kingdom .	10·81	75·1
2. New South Wales .	1·06	7·3
3. Victoria . . .	0·97	6·1
4. United States . .	0·60	4·2
5. All Brit. Possessions .	2·80	19·4
6. All Foreign Countries	0·78	5·4
Average total value .	£14·39	100

Jamaica: Imports.[1]—Countries.

Principal Countries of Origin	Average Value in mln. £, 1901–1905	Percentages
1. United Kingdom .	0·92	48·4
2. United States . .	0·78	41·0
3. Canada . . .	0·14	7·1
4. Germany . . .	0·04	1·9
Average total value .	£1·89	100

Jamaica: Exports.[1]—Countries.

Principal Destinations	Average Value in mln. £, 1901–1905	Percentages
1. United States . .	1·11	61·5
2. United Kingdom .	0·35	19·4
3. France . . .	0·11	6·1
4. Canada . . .	0·08	4·5
Average total value .	£1·81	100

Jamaica: Imports.[1]—Articles.

Principal Articles	Average Value in mln. £, 1901–1905	Percentages
1. Cotton manufactures	0·29	15·2
2. Wheat flour . .	0·16	8·6
3. Fish, dried or salted .	0·11	5·7
4. Coal and coke . .	0·10	4·9
5. Wood and timber .	0·06	3·4
Average total value .	£1·89	100

Jamaica: Exports.[1]—Articles.

Principal Articles	Average Value in mln. £, 1901–1905	Percentages
1. Fruit	0·91	50·3
2. Sugar	0·13	7·3
3. Coffee	0·12	6·8
4. Rum	0·11	6·3
5. Pimento . . .	0·10	5·2
Average total value .	£1·81	100

Mexico: Imports.[2]—Articles.

Principal Articles	Average Value in mln. £, 1901–1905	Percentages
1. Machinery . . .	1·68	10·1
2. Cotton yarns and tissues . .	1·14	6·8
3. Coal and coke . .	0·83	5·0
4. Iron and steel, excl railway material .	0·81	4·9
Average total value .	£16·66	100

Mexico: Exports.[2]—Articles.

Principal Articles	Average Value in mln. £, 1901–1905	Percentages
1. Silver bullion and ore	5·71	30·0
2. Henequen, raw . .	2·83	14·9
3. Copper, ore and unwrought . .	2·24	11·8
4. Gold bullion and ore .	1·61	8·5
5. Coffee	0·87	4·6
Average total value .	£19·05	100

Mexico: Imports.[2]—Countries.

Principal Countries of Origin	Average Value in mln. £, 1901–1905	Percentages
1. United States . .	9·74	58·5
2. United Kingdom .	1·97	11·8
3. Germany . . .	1·83	11·0
4. France . . .	1·48	8·9
Average total imports	£16·66	100

Mexico: Exports.[2]—Countries.

Principal Destinations	Average Value in mln. £, 1901–1905	Percentages
1. United States . .	13·83	72·6
2. United Kingdom .	2·27	11·9
3. Germany . . .	1·09	5·7
4. Belgium . . .	0·61	3·2
Average total imports	£19·05	100

[1] Including bullion and specie. [2] Five years ending June 30, 1906. Including bullion and specie.

Cape Colony: Imports.[1]—Articles.

Principal Articles	Average Value in mln. £, 1901–1905	Percentages
1. Haberdashery, &c.	1·78	6·6
2. Hardware, &c.	1·45	5·4
3. Railway and tramway materials	1·44	5·3
4. Cotton manufactures	1·37	5·1
5. Wheat and flour	1·26	4·7
6. Meat, fresh, salted, &c.	1·25	4·7
7. Apparel and slops	1·12	4·1
8. Bullion and specie	1·11	4·1
9. Machinery	1·04	3·9
Average total value	£26·95	100

Cape Colony: Exports.[1]—Articles.

Principal Articles	Average Value in mln. £, 1901–1905	Percentages
1. Bullion and specie	12·15	52·3
2. Diamonds	5·80	25·0
3. Wool, raw	1·78	7·7
4. Ostrich feathers	0·96	4·1
5. Angora hair	0·62	2·7
6. Copper	0·48	2·1
7. Skins: sheep, goats	0·45	1·9
8. Coal	0·14	0·6
9. Hides	0·06	0·2
10. Wine	0·02	0·1
Average total value	£23·23	100

Cape Colony: Imports.[1]—Countries.

Principal Countries of Origin	Average Value in mln. £, 1901–1905	Percentages
1. United Kingdom	16·93	62·8
2. United States	2·67	9·9
3. Victoria	1·47	5·5
4. Argentine Republic	1·03	3·8
5. Germany	1·01	3·7
6. Natal	0·55	2·0
Average total value	£26·95	100

Cape Colony: Exports.[1]—Countries.

Principal Destinations	Average Value in mln. £, 1901–1905	Percentages
1. United Kingdom	21·26	91·5
2. Argentine Republic [2]	0·72	3·1
3. German S.W. Africa	0·37	1·6
4. Natal	0·20	0·9
5. Germany	0·20	0·9
6. Belgium	0·11	0·5
Average total value	£23·23	100

Egypt: Special Imports.—Articles.

Principal Articles	Average Value in mln. £, 1901–1905	Percentages
1. Cotton piece goods	2·69	14·7
2. Wood for building	1·04	5·7
3. Iron and steel manufactures	0·96	5·3
4. Coal	0·94	5·2
5. Wool and silk manufactures	0·75	4·1
6. Machinery	0·68	3·7
7. Tobacco	0·65	3·6
8. Flour of wheat, maize	0·64	3·5
Average total value	£18·25	100

Egypt: Special Exports.—Articles.

Principal Articles	Average Value in mln. £, 1901–1905	Percentages
1. Cotton, raw	15·15	77·8
2. Cotton seed	1·76	9·0
3. Tobacco, cigarettes	0·48	2·5
4. Sugar	0·39	2·0
5. Onions	0·22	1·1
6. Beans	0·22	1·1
7. Oil-cake	0·20	1·0
8. Hides and skins, raw and tanned	0·10	0·5
Average total value	£19·48	100

Egypt: Special Imports.—Countries.

Principal Countries of Origin	Average Value in mln. £, 1901–1905	Percentages
1. United Kingdom and Possessions in the Mediterranean	6·50	35·6
2. Turkey	2·57	14·1
3. France and Algeria	1·79	9·8
4. Austria-Hungary	1·31	7·2
5. India, China, and Japan	1·13	6·2
6. Italy	0·99	5·4
7. Germany	0·78	4·3
Average total value	£18·25	100

Egypt: Special Exports.—Countries.

Principal Destinations	Average Value in mln. £, 1901–1905	Percentages
1. United Kingdom and Possessions in the Mediterranean	10·09	51·8
2. France and Algeria	1·58	8·1
3. Germany	1·51	7·8
4. Russia	1·41	7·2
5. America	1·04	5·3
6. Austria-Hungary	0·87	4·5
7. Switzerland	0·72	3·7
8. Italy	0·72	3·7
Average total value	£19·48	100

[1] Including bullion and specie.

[2] Chiefly gold specie.

The following table gives the declared values of British Imports and Exports of British Produce and Manufactures in the undermentioned years, compared with the values computed at the prices of 1873: *A*, Aggregate value of articles for which the price was separately calculated; *B*, Declared value of total trade, with the value computed on the assumption that the values of the total were affected in the same proportion as the aggregate of the articles included under *A*.[1]

Year	*A*. Imports		*A*. Exports		*B*. Imports		*B*. Exports	
	Value in Millions Sterling				Value in Millions Sterling			
	Declared	Computed	Declared	Computed	Declared	Computed	Declared	Computed
1873	308	308	172	172	371	371	255	255
1879	289	349	122	174	363	438	191½	273
1883	336	403	146	212½	427	512	240	349
1884	300	383	140	208	390	498	233	346
1885	281½	384½	131	201½	371	507	213	328
1886	263	382½	131	215	350	509	212½	349

[1] From Report by Mr. R. Giffen to the Secretary of the Board of Trade, published as a Parliamentary paper, 1888 [C.—5386]. The tables on the two following pages are from the same report.

TABLE OF SHIPPING.

Aggregate Tonnage of Vessels above 100 Tons Burden.

Net tonnage of sailing vessels, gross tonnage of steamers.
(Based on 'Lloyd's Universal Register.')

Millions of Tons and Decimals.

	Wood and Composite	Iron and Steel	Steamers	Sailing Vessels	Total	
					Tonnage	Per cent.
United Kingdom, 1888 .	0·76	8·37	6·47	2·66	9·13	44·01
British Colonies „ .	1·07	0·87	0·39	1·04	1·43	6·92
United States „ .	1·60	0·35	0·51	1·44	1·95	9·39
Norway „ .	1·28	0·14	0·16	1·26	1·42	6·87
Germany „ .	0·58	0·81	0·66	0·73	1·39	6·69
France „ .	0·22	0·78	0·73	0·26	1·00	4·80
United Kingdom, 1900 .	0·16	13·08	11·51	1·73	13·24	45·59
British Colonies „ .	0·41	0·61	0·64	0·38	1·02	3·51
United States „ .	1·30	1·45	1·45	1·30	2·75	9·47
Norway „ .	0·72	0·92	0·76	0·88	1·64	5·65
Germany „ .	0·08	2·57	2·16	0·49	2·65	9·13
France „ .	0·07	1·28	1·05	0·30	1·35	4·65
Japan[1] „ .	0·15	0·43	0·49	0·09	0·57	1·96
United Kingdom, 1907 .	0·10	16·90	15·93	1·07	17·00	43·10
British Colonies „ .	0·29	1·03	1·07	0·25	1·32	3·35
United States „ .	1·30	3·16	3·12	1·35	4·47	11·33
Norway „ .	0·35	1·57	1·26	0·65	1·92	4·87
Germany „ .	0·02	4·09	3·71	0·40	4·11	10·42
France „ .	0·09	1·67	1·28	0·48	1·76	4·46
Japan[1] „ .	0·09	0·98	1·07	—	1·07	2·71
Total (all Countries), 1888	7·99	12·75	10·92	9·82	20·74	
„ „ 1900	4·14	24·91	12·37	6·67	29·04	
„ „ 1907	3·13	36·31	33·97	5·47	39·44	

[1] Preceded in 1900 also Italy, Russia, Spain, and Sweden; in 1907 only by Italy.

Average Prices of British Imports and Exports of certain Commodities in the under-mentioned Years.

I. Imports.

Years	Wheat	Maize	Rice	Raw Sugar	Refined Sugar	Tea	Coffee	Unmanfd. Tobacco
	per cwt. s.	per cwt. s.	per cwt. s.	per cwt. s.	per cwt. s.	per lb. d.	per cwt. £	per lb. d.
Extreme years 1854–1870	9·20 to 16·75	6·29 to 10·14	9·02 to 14·64	20·29 to 35·14	28·57 to 45·98	14·61 to 19·88	2·65 to 3·97	7·33 to 12·00
1871	11·84	7·69	10·19	25·10	36·15	16·44	3·15	8·09
1872	12·42	7·09	10·00	26·20	36·35	16·78	3·54	8·24
1873	13·01	7·06	9·92	23·97	33·84	16·67	4·42	7·72
1874	12·15	8·46	10·33	22·42	30·70	17·00	5·03	8·34
1875	10·61	7·95	8·95	21·16	30·33	16·78	4·73	8·63
1876	10·43	6·39	9·06	20·92	29·45	16·42	4·68	8·36
1877	12·49	6·47	10·55	25·73	33·79	15·98	4·83	8·05
1878	10·99	6·04	10·48	21·47	29·26	15·29	4·66	6·73
1879	10·56	5·43	10·15	20·22	27·30	14·68	4·40	7·20
1880	11·08	6·00	9·52	21·71	29·23	13·47	4·44	7·04
1881	11·04	6·22	8·64	21·72	28·93	12·82	3·87	6·85
1882	10·67	7·15	7·98	21·11	28·67	12·58	3·81	7·67
1883	9·81	6·53	8·20	20·10	27·22	12·46	3·51	7·63
1884	8·41	5·89	8·14	15·51	20·89	11·78	3·30	7·87
1885	7·83	5·39	7·82	13·89	18·15	12·06	3·19	7·92
1886[3]	7·55	4·91	7·48	13·07	16·70	11·77	3·27	7·23

Years	Refined Petroleum	Copper Ore	Tin	Crude Zinc	Guano	Nitrate of Soda	Window Glass	Rags	Esparto	Paper
	per gal. d.	per ton £	per cwt. £	per ton £	per ton £	per cwt. s.	per cwt. s.	per ton £	per ton £	per cwt. s.
Extreme years 1854–1870	15·82 to[1] 35·91	11·44 to 18·93	4·02 to 6·87	17·62 to 29·74	9·15 to 12·58	10·96 to 20·08	14·00 to 16·29	16·77 to[2] 20·92	4·49 to[2] 9·66	51·33 to[2] 56·15
1871	16·59	13·65	6·34	20·55	11·11	15·59	14·95	16·53	8·63	51·22
1872	16·85	17·23	6·92	20·30	10·12	15·31	17·27	16·76	7·98	56·33
1873	14·30	16·54	6·70	23·38	11·41	14·68	18·76	17·63	8·47	60·80
1874	11·10	14·91	4·91	22·21	12·00	12·00	17·45	17·06	8·42	53·09
1875	9·62	13·78	4·33	22·57	11·30	11·99	16·79	17·34	8·04	47·11
1876	13·74	12·38	3·77	22·58	11·52	11·47	15·80	16·51	8·23	48·64
1877	12·66	10·10	3·49	20·49	10·88	13·52	14·59	14·97	7·60	49·92
1878	9·70	8·65	3·13	18·64	10·16	14·88	13·71	15·19	6·93	49·51
1879	7·68	8·69	3·41	16·62	9·15	14·02	14·12	15·33	6·77	37·40
1880	8·15	9·37	4·45	18·94	10·06	15·32	14·36	15·24	7·19	36·62
1881	7·96	7·81	4·61	16·40	9·73	14·64	14·60	14·80	6·83	36·18
1882	6·92	9·73	5·23	16·93	8·64	13·27	15·73	14·31	7·09	35·29
1883	7·39	10·34	4·69	15·70	9·76	11·41	15·69	14·08	6·74	33·02
1884	7·75	11·10	4·07	14·69	9·10	9·64	13·90	13·46	6·29	30·49
1885	7·44	7·04	4·28	14·11	9·70	9·92	13·63	13·16	5·98	29·92
1886	7·04	6·85	4·81	14·32	7·81	9·94	12·58	12·45	5·51	31·21

Years	Cotton	Flax	Raw Silk	Wool	Hewn Wood	Hides, Dry and Wet
	per cwt. £	per cwt. s.	per lb. s.	per lb. d.	per load £	per cwt. £
Extreme years 1854–1870	2·55 to 9·79	39·04 to 60·53	13·85 to 26·56	13·65 to 18·02	2·91 to 4·35	2·52 to 4·06
1871	3·52	46·96	21·62	13·32	2·82	2·99
1872	4·24	52·28	21·43	14·51	2·91	3·42
1873	4·01	49·95	20·97	14·75	3·24	3·53
1874	3·62	48·76	16·80	14·71	3·22	3·63
1875	3·47	53·05	15·35	15·41	2·87	3·48
1876	3·02	55·29	19·18	14·54	2·90	3·13
1877	2·93	49·37	20·05	14·38	2·81	3·09
1878	2·80	48·01	17·65	13·90	2·45	2·93
1879	2·76	45·25	17·42	13·56	2·10	2·88
1880	2·94	46·13	17·04	13·66	2·47	3·12
1881	2·92	41·04	16·98	13·87	2·57	3·18
1882	2·93	38·73	16·54	12·27	2·62	3·15
1883	2·91	39·92	16·20	12·08	2·61	3·18
1884	2·85	40·73	14·79	12·09	2·39	3·19
1885	2·86	41·62	14·07	10·05	2·40	3·15
1886	2·49	41·52	13·73	9·08	2·16	2·96

[1] 1863 to 1870. [2] 1861 to 1870.
[3] For later years see the *Statistical Abstract for the United Kingdom.*

II. EXPORTS.

(British Produce and Manufactures.)

Years	Alkali	Salt	Soap	Candles	Plate Glass	Coals	Pig and Puddled Iron
	per cwt. s.	per ton s.	per cwt. s.	per doz. lbs. s.	per sq. foot s.	per ton s.	per ton s.
Extreme years 1840–1870	7·58 to 11·04	8·98 to 11·94	24·71 to 33·19	7·19 to 11·87	2·04 to[1] 2·67	7·09 to 10·18	44·93 to 85·05
1871	8·37	10·47	27·14	7·78	1·95	9·03	61·08
1872	11·17	14·15	26·04	7·89	2·29	15·51	100·85[2]
1873	12·33	18·77	26·45	8·04	3·01	20·49	124·65[2]
1874	10·45	16·00	25·35	8·26	3·06	16·98	94·67
1875	9·16	14·75	24·74	8·00	2·62	13·10	72·80
1876	8·15	12·35	24·58	7·60	2·22	10·80	62·47
1877	7·73	11·10	24·45	7·73	2·22	10·05	57·34
1878	7·00	12·31	24·15	7·64	1·85	9·35	53·52
1879	6·34	11·50	22·54	6·81	1·58	8·63	51·50
1880	6·96	11·49	22·47	6·80	1·62	8·76	63·94
1881	6·14	11·64	22·48	6·52	1·52	8·83	55·38
1882	6·14	11·90	22·40	6·50	1·53	8·99	56·45
1883	6·12	12·84	22·96	6·72	1·42	9·20	52·14
1884	6·37	12·91	22·99	6·66	1·45	9·18	46·40
1885	5·87	14·59	23·50	6·14	1·27	8·83	43·56
1886	5·73	14·61	20·93	5·40	1·09	8·32	43·17

Years	Tin, Unwrought	Tinned Plates	Copper, Unwrought	Lead: Pig, Sheet, and Pipe	Cement	Cotton Yarn	Cotton piece goods: Plain	Cotton piece goods: Printed	Wool: Sheep and Lamb's
	per cwt. £	per ton £	per cwt. £	per ton £	per cwt. s.	per lb. d.	per yd. d.	per yd. d.	per lb. d.
Extreme years 1840–1870	3·04 to 6·64	23·47 to[3] 26·71	3·73 to 5·96	17·24 to 24·88	2·43 to[4] 4·12	10·44 to 28·80	2·79 to 5·79	4·01 to 6·32	11·40 to 23·89
1871	6·70	24·25	3·78	19·27	2·44	18·66	3·33	4·71	16·64
1872	7·47	32·24	4·81	20·45	2·45	18·87	3·51	4·92	19·86
1873	6·83	32·77	4·68	23·75	3·04	17·76	3·45	4·78	21·18
1874	5·24	30·21	4·40	22·63	2·98	15·79	3·22	4·69	21·92
1875	4·57	26·64	4·40	23·17	2·61	14·66	3·13	4·77	21·14
1876	3·96	21·81	4·13	22·55	2·55	13·19	2·83	4·48	18·53
1877	3·68	19·80	3·78	21·49	2·58	12·85	2·83	4·31	17·73
1878	3·32	17·60	3·49	18·74	2·56	12·47	2·76	4·18	19·87
1879	3·60	17·81	3·17	15·42	2·49	12·33	2·65	3·91	14·39
1880	4·52	20·48	3·41	17·41	2·50	13·25	2·73	3·79	16·57
1881	4·80	17·11	3·28	15·72	2·37	12·39	2·65	3·68	15·26
1882	5·24	17·51	3·57	15·45	2·34	12·96	2·71	3·73	15·20
1883	4·88	17·47	3·38	14·07	2·31	12·25	2·61	3·62	12·71
1884	4·27	16·45	2·94	12·58	2·25	12·24	2·47	3·60	10·94
1885	4·43	14·84	2·40	12·25	2·20	11·58	2·33	3·47	9·55
1886	5·03	14·16	2·19	13·85	2·02	10·84	2·21	3·18	10·07

Years	Woollen and Worsted Yarn	Woollen Cloths, &c.	Linen Manufactures: Plain	Linen Manufactures: Sails and Sailcloth	Jute Manufactures	Silk Manufactures	Boots and Shoes
	per lb. d.	per yd. d.	per yd. d.	per yd. d.	per yd. d.	per yd. s.	per doz. prs. s.
Extreme years 1840–1870	22·12 to 41·06	23·83 to 40·09	6·84 to 8·50	8·34 to 14·20	3·56 to[5] 6·16	3·14 to[6] 4·09	60·82 to[6] 75·83
1871	33·49	37·52	7·39	12·94	3·95	3·32	59·72
1872	36·91	41·19	7·43	14·29	4·22	3·15	58·54
1873	37·26	41·00	7·62	13·67	3·98	3·54	64·73
1874	38·14	39·53	7·80	14·41	3·57	3·36	67·02
1875	38·58	39·09	7·59	14·36	3·30	3·08	65·56
1876	34·36	38·25	7·14	14·37	3·09	3·29	63·35
1877	32·12	35·72	6·93	13·71	3·18	3·22	61·28
1878	30·07	34·53	7·20	12·96	3·10	3·32	61·16
1879	26·71	31·89	7·08	11·69	2·87	3·38	60·52
1880	30·33	32·34	7·38	12·15	2·95	3·26	61·03
1881	26·04	32·55	7·03	12·01	2·78	3·27	57·13
1882	25·62	31·18	6·89	12·44	2·70	3·37	58·72
1883	23·41	38·30	6·95	11·73	2·64	3·26	60·10
1884	23·78	41·42	6·62	10·95	2·43	3·26	59·92
1885	24·19	40·23	6·35	10·83	2·13	3·72	58·09
1886	23·19	39·56	5·98	11·09	2·01	3·97	58·38

[1] 1857 to 1870. [2] Export of iron, wrought and unwrought, from the United Kingdom to the United States in thousands of tons:—1869, 735; 1870, 832; 1871, 1064; 1872, 975; 1873, 493; 1874, 287. Do. to Germany:—1869, 200; 1872. 440; 1873, 396; 1874, 227.
[3] 1857 to 1870. [4] 1843 to 1870. [5] 1861 to 1870. [6] 1862 to 1870.

COST OF TRANSPORT.

100 tons per mile by rail, United States.[1]

Year	s.	Year	s	Year	s.
1865	16·9	1872	10·0	1879	7·08
1866	15·4	1873	10·3	1880	7·24
1867	16·2	1874	8·18	1881	7·00
1868	14·4	1875	8·64	1882	6·10
1869	12·8	1876	8·40	1883	5·72
1870	11·6	1877	8·56	1884	5·32
1871	10·5	1878	7·41	1889	4·07

TABLE SHOWING THE AVERAGE PRODUCTION OF GOLD AND SILVER IN FIVE-YEAR PERIODS, 1851–55 TO 1866-70, AND THE YEARLY PRODUCTION FROM 1871 TO 1908.[2]

Years	Thousand Ozs. Gold, Fine	Thousand Ozs. Silver	Years	Thousand Ozs. Gold, Fine	Thousand Ozs. Silver
1851–55	6,411	28,485	1888	5,331	108,828
1856–60	6,488	29,096	1889	5,974	120,214
1861–65	5,950	35,397	1890	5,749	126,095
1866–70	6,270	43,049	1891	6,320	137,171
1871	5,591	63,317	1892	7,094	153,152
1872	5,591	63,317	1893	7,619	165,473
1873	4,654	63,267	1894	8,764	164,610
1874	4,390	55,301	1895	9,615	167,801
1875	4,717	62,262	1896	9,784	157,061
1876	5,016	67,753	1897	11,420	160,421
1877	5,512	62,680	1898	13,878	169,055
1878	5,761	73,385	1899	14,838	168,337
1879	5,262	74,383	1900	12,315	173,591
1880	5,149	74,795	1901	12,626	173,011
1881	4,984	79,021	1902	14,355	162,763
1882	4,934	86,472	1903	15,853	167,689
1883	4,615	89,175	1904	16,804	164,195
1884	4,921	81,568	1905	18,396	172,318
1885	5.246	91,610	1906	19,471	165,054
1886	5,136	93,297	1907	19,956	184,194
1887	5,117	96,124	1908	21,378	203,186

ANNUAL AVERAGE PRICE OF BAR SILVER IN LONDON, IN PENCE.[3]

Extreme years, 1861 to 1872, $60\frac{5}{16}$*d.* to $61\frac{7}{16}$*d.*

Year	d.	Year	d.	Year	d.
1873	$59\frac{1}{4}$	1880	$52\frac{1}{4}$	1901	$27\frac{3}{16}$
1874	$58\frac{5}{16}$	1881	$51\frac{11}{16}$	1902	$24\frac{1}{16}$
1875	$56\frac{1}{8}$	1882	$51\frac{5}{8}$	1903	$24\frac{3}{4}$
1876	$52\frac{3}{4}$	1883	$50\frac{9}{16}$	1904	$26\frac{3}{8}$
1877	$54\frac{13}{16}$	1884	$50\frac{5}{8}$	1905	$27\frac{3}{16}$
1878	$52\frac{9}{16}$	1885	$48\frac{5}{8}$	1906	$30\frac{7}{8}$
1879	$51\frac{1}{4}$	1886	$45\frac{3}{8}$	1907	$30\frac{3}{16}$

[1] Mainly based on *L'Economiste français*, 1886, I. p. 730.

[2] Based on the *Stat. Jahrb. f. das Deutsche Reich*, 1906, p. 23* [Cd. 4954], 1909, pp. 140–1, and the last Annual Report of the Director of the Mint, U.S.

[3] Statement of Mr. Stewart Pixley, in Appendix to the First Report of the Royal Commission on Gold and Silver; the figures for 1901 to 1907 from the Annual Commercial History and Review, in the *Economist*.

STANDARD COINS AND MONEYS OF ACCOUNT OF PRINCIPAL COUNTRIES.[1]

A. Gold Standard Countries and countries that receive only gold in unlimited quantity for coinage, although silver may be unlimited legal tender.

Countries	Names of Gold Coins	Gross weight in grains Troy	Fine grains per 1000	Fine weight in grains on issue	Money of Account	Value in pence sterling
United Kingdom, Australasia, and Cape Colony	sovereign	123·274	916·667	113·0016	pound of 240 pence	240
Canada . . .					dollar	49·35
France, Belgium, and Switzerland	20 francs	99·563	900·000	89·607	franc[2] of 100 cents	9·51
Germany . .	20 marks	122·918	900·000	110·6268	mark of 100 pfennigs	11·74
Denmark, Sweden, and Norway	20 crowns	138·283	900·000	124·4542	crown of 100 ore	13·21
Netherlands . .	10 florins	103·844	988·000	93·4599	florin (gulden) of 100 cents	19·85
Portugal . .	10 milreis	273·693	916·667	250·8853	milreis of 1000 reis	53·28
Brazil[3] . . .	10 milreis	138·348	916·667	126·8200	milreis of 1000 reis	26·93
Egypt . . .	50 piastres	66·097	875·000	57·8347	piastre of 40 paras	2·16
United States .	10 dollars	258·000	900·000	232·2000	dollar of 100 cents	49·31

B. Silver Standard Countries.

Countries	Names of Coins and Money of Account	Gross weight in grains Troy	Fine grains per 1000.	Fine weight on issue	Intrinsic Value in pence sterling; silver at 45*d*. per oz.	Rate of Exchange at London, June 1886
India, Burma, Ceylon, and Mauritius	rupee of 192 pies	180·000	916·667	165·000	16·72	17¾*d*. per R. (see pp. 585, 610)
Austria-Hungary[4]	2 florins, each = 100 kreuzer	381·046	900·000	342·941	17·37[5]	£1 = 12·63½ fl.
Russia . . .	rouble of 100 copecks	319·936	868·056	277·722	28·15	28½*d*. per R.
Mexico . . .	peso (or dollar) of 100 centavos	417·666	902·778	377·059	38·21	38⅜*d*.[6] per P.
Shanghai . .	tael of 1000 cash	565·000	900·000	508·500	51·53	(see p. 588)
Japan[4] . . .	yen of 100 sen	416·000	900·000	374·400	37·93	40*d*. per yen
Dutch East Indies .	florin of 25 cents	49·075	720·000	35·339	3·58	
—	trade dollar of 100 cents[7]	420·000	900·000	378·000	38·31	

[1] As in 1889, based chiefly on J. H. Norman's 'Local Dual Standards.'

[2] The French franc = the lira of Italy, the peseta of Spain, the drachma of Greece, the dinar of Servia, the ley of Roumania, the lew of Bulgaria. The peso of the Argentine Republic, Uruguay, Chile, Ecuador, Guatemala, and Costa Rica, the boliviano of Bolivia, the sol of Peru, and the venezolano of Venezuela and Colombia each = 5 francs.

[3] The actual currency in Brazil is inconvertible paper.

[4] Austria-Hungary and Japan now have a gold standard. The currency unit is a krone of 100 heller, exchanging at 24 to the £. As to Japan, see p. 417.

[5] Value of florin.

[6] Mexico being a great producer of silver (see p. 188), the rate of exchange, London on Mexico, corresponds closely to the intrinsic value of the Mexican dollar in accordance with the price of bar silver in London (see p. 620). The Mexican dollar formerly circulated in the Straits Settlements and Hong-Kong, but a dollar of the value of 2*s*. 4*d*. is now the standard coin in the Straits Settlements, the Federated Malay States, British N. Borneo and Saráwak.

[7] In circulation in south-eastern Asia.

PRINCIPAL UNITS OF THE METRIC SYSTEM WITH THEIR ENGLISH EQUIVALENTS.

(According to a statement made to the French Académie des Sciences on February 4, 1889, the metric system of weights and measures was obligatory in 1887 in countries with an aggregate population of 302¼ millions, and was optional in other countries, among which is the United Kingdom, with an aggregate population of 97 millions. It was at the same date admitted in principle or applied in part in countries with an aggregate population of 395 millions. In all, a population of 795 millions recognised the system in some way. See 'Board of Trade Journal,' No. 32, p. 303.)

1 metre	= 39·37 inches = 3·28 feet.
(1 kilometre	= ·6214 mile.)
1 are	= 1076·4 square feet = ·0247 acre.
(1 hectare	= 100 ares, therefore = 2·47 acres.
1 sq. kilometre	= 100 hectares = ·386 sq. mile.)
1 stere (or cubic metre)	= 61,028 cubic inches = 35·317 cubic feet.
1 gramme	= ·035 oz. = ·0022 lb. avoir.
(1 hectogramme	= 3·5274 oz.
1 kilógramme	= 2·205 lbs.
1 metric quintal	= 100 kilos = 220·5 lbs.
1 metric ton	= 1000 kilos = 2204·6 lbs. = ·984 English ton.)
1 litre	= 1·76 pint.
(1 hectolitre	= 22·0097 gallons, or 2·7512 bushels. Hectolitres per hectare × 1·113 = bushels per acre.)

DISTANCES IN NAUTICAL MILES
(60 = 1 degree).

WHEAT PORTS.

From London to—

Hamburg	430	Karáchi	6,100	New York	3,300
St. Petersburg	1,420	Bombay	6,300	Montreal	3,135
Fiume	2,975	Adelaide	10,800	Valparaiso	9,045[1]
Odessa	3,520	Wellington, N.Zd.	12,520	San Francisco	13,810[1]

London and Liverpool distances are approximately the same to all the ports mentioned except Hamburg, St. Petersburg, New York, and Montreal. In the case of all southern and western ports, add 120 to find the distance from Hull; 35 from Antwerp; 300 from Hamburg. For Marseilles subtract 1,700 in the case of Karáchi, Bombay, Adelaide, and Wellington.

	From Liverpool	From Hull	From Antwerp		From Marseilles	From L'pool
To Hamburg	930	885	870	To Fiume	1,200	2,980
„ St. Petersburg	1,930	1,300	1,370	„ Odessa	1,765	3,520
„ Montreal	2,800	3,200	3,115	„ New York	3,870	3,030

AVERAGE DURATION OF VOYAGE TO THE PORTS OF THE UNITED KINGDOM.

From	By sail	By steam	From	By sail	By steam
	days	days		days	days
Black Sea	75	20	Eastern Atlantic Ports	30	14
Alexandria	45	16	Chile	120	—
Smyrna	45	—	San Francisco and Oregon	135	—
East Indies	120	45	Australia	120	—

[1] By Cape Horn direct.

WOOL PORTS.

From London to—

Constantinople	3,160	Buenos Ayres	6,350	Sydney	11,630
Cape Town	6,220	Melbourne	11,150	Brisbane	12,100

For Antwerp distances, add 35; Hamburg, 300. Dunkirk, subtract 58; Havre, 200. For Montevideo, subtract 100 from the distances to Buenos Ayres. For Adelaide and Wellington see under Wheat Ports.

COTTON PORTS.

	From New Orleans	From Savannah	From Pernambuco	From Alexandria	From Bombay
To Liverpool	4,820	3,800	4,060	3,090	6,300
„ London	4,900	3,880	4,145	3,090	6,300
„ Fall River	1,865	800	3,620	4,830	8,040

For Antwerp, Hamburg, and Havre distances, add and subtract as directed under Wool Ports.

Comparison of Ocean Routes by the Cape of Good Hope and Cape Horn with the Suez Canal, Panama, and Tehuantepec Routes.

To	From London or Liverpool: By Cape Horn	By Cape of Good Hope	By Suez Canal	By Isth. Panama	By Isth. Tehuantepec[9]	From New York: By Cape Horn	By Cape of Good Hope	By Suez Canal	By Isth. Panama	By Isth. Tehuantepec
Bombay	—	10,850	6,300	—	—	—	11,440	8,200	—	—
Calcutta	—	11,770[4]	7,990[7]	—	—	—	12,360[4]	9,890[7]	—	—
Singapore	—	11,840[5]	8,270[7]	—	—	—	12,430[5]	10,170[7]	—	—
Hong Kong	—	13,160[5]	9,690[7]	14,080	13,400	—	13,750[5]	11,590[7]	11,280	10,250
Yokohama	—	14,370[5]	11,250[7]	12,520	11,840	—	15,160[5]	13,150[7]	9,720	8,690
Melbourne	14,215[1]	12,300[6]	11,150[6]	12,950[8]	12,920[10]	13,750[1]	12,890[6]	13,050[6]	10,150[8]	9,770[10]
Auckland	12,620[1]	14,380[6]	12,670[6]	11,350	11,320[11]	12,150[1]	14,970[6]	14,570[6]	8,550	8,170[11]
Acapulco	12,820[2]	—	—	6,250	5,570	12,350[2]	—	—	3,450	2,420
San Francisco	14,630[2]	—	—	8,060	7,380	14,160[2]	—	—	5,260	4,230
Callao	10,600[2]	—	—	6,180	7,260	10,130[2]	—	—	3,380	4,110
Valparaiso	9,340[2]	—	—	7,440	9,520	8,870[2]	—	—	4,640	6,370
Honolulu	15,860[2]	—	—	9,570	8,890	15,390[2]	—	—	6,770	5,740

New Orleans is about 500 miles nearer ports on the west coast of America and the east of Asia than New York by the Isthmus of Panama, and about 1,000 miles nearer than New York by the Isthmus of Tehuantepec.

The Isthmus of Suez is pierced by a ship canal 100 miles in length, opened in 1869. The Isthmus of Panama has been crossed by a railway since 1855, and the construction of a ship canal 46½ miles in length across the Isthmus was begun in 1881. An Isthmian Canal Commission appointed by the United States in 1899 recommended the construction of a ship canal with a depth of 35 feet and a bottom

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[1] Keeping N. after leaving Cape Horn.

[2] By Pernambuco, Bahia, Rio de Janeiro, Montevideo, Valparaiso, and Callao. To Honolulu direct by Cape Horn, from London, 13,980 miles; from New York, 13,510 miles.

[3] By the route indicated in Note 2.

[4] By Mauritius and Pt. de Galle.

[5] By Sunda Straits.

[6] By King George's Sound.

[7] By Pt. de Galle.

[8] By Auckland.

[9] To Isthmus of Tehuantepec by Bermuda.

[10] By Tahiti and Auckland

[11] By Tahiti.

width of 150 feet, either by the Panama route or by way of Lake Nicaragua. The latter, from Greytown on the Caribbean Sea to Brito on the Pacific, would be 187 miles long, of which 70 miles would be in the lake. In January 1902 an act of Congress authorised the President of the United States to take the necessary steps for acquiring and completing the Panama Canal.

YEARLY RETURN OF SHIPPING AND NET TONNAGE THROUGH THE SUEZ CANAL FROM ITS OPENING.

Tonnage in thousands of tons (000 omitted).

Year	No. of Vessels	Tonnage	Year	No. of Vessels	Tonnage	Year	No. of Vessels	Tonnage
1869	10	6·6	1876	1457	2097	1901	3699	10824
1870	486	437	1877	1663	2355	1902	3708	11248
1871	765	761	1878	1593	2270	1903	3761	11907
1872	1082	1161	1879	1477	2263	1904	4237	13402
1873	1173	1368	1880	2026	3057	1907	4267	14728
1874	1264	1632	1881	2727	4137	1908	3795	13633
1875	1494	2010	1882	3198	5057	1909	4239	15408

AUSTRALIAN TRAFFIC THROUGH THE CANAL FROM 1878.

Year	No. of Vessels	Net Tonnage	Year	No. of Vessels	Net Tonnage	Year	No. of Vessels	Net Tonnage
1878	27	46	1882	166	343	1904	236	924
1879	42	72	1883	226	489	1907	314	1318
1880	51	108	1884	253	554	1908	—	1234
1881	98	209	1885	228	534	1909	—	1544

The average duration of the passage in 1887 (the first year in which night passages were allowed) was 34 hours 3 minutes; in 1890, 24 hours 6 minutes; in 1909, 17 hours 13 minutes. On January 1, 1906, the maximum draught of vessels allowed to pass through the canal was raised from 26 feet 3 inches to 27 feet. The percentage of the net tonnage passing through the canal made up by British shipping was in 1900 57·6, in 1901 57·8, in 1907 64·5, in 1909 62·2.

FOREST AREA OF EUROPE.

	Thousand acres	Per cent.
Russia	469,500	34
Sweden	43,000	24
Austria-Hungary	42,624	29
France	20,642	19
Spain	20,465	16·3
Germany	20,047	25·6
Norway	17,290	25
Italy	9,031	18
Turkey	5,958	14
United Kingdom	2,500	3·8
Switzerland	1,905	18·8
Greece	1,886	11·8
Würtemberg	1,494	31
Baden	1,338	33
Portugal	1,107	5
Belgium	1,073	12
Holland	486	6
Denmark	364	4·6

G. S. BOULGER, *Wood.*

I.—Table of Net or Special Imports.

Averages of Five-year Periods, 1875–9 *to* 1905–8 (*four years*).

(From Statistical Tables and Charts relating to British and Foreign Trade and Industry. [Cd. 4954] 1909.)

Annual Average	United Kingdom				France				Germany				United States			
	Total Value[1]	Per Head of Pop.			Total Value	Per Head of Pop.			Total Value	Per Head of Pop.			Total Value[2]	Per Head of Pop.		
	Mln. £	£	s.	d.	Mln. £	£	s.	d.	Mln. £	£	s.	d.	Mln. £	£	s.	d.
1875–9	319·5	9	10	4	159·7	4	6	4	—[3]		—[3]		96·2	2	1	6
1880–4	343·6	9	15	3	190·9	5	1	2	151·8	3	7	2	140·1	2	13	4
1885–9	318·8	8	14	2	166·0	4	6	10	159·9	3	7	7	139·3	2	7	6
1890–4	357·1	9	7	1	168·8	4	8	0	198·9	3	18	10	162·7	2	10	0
1895–9	392·7	9	16	5	163·7	4	4	8	232·8	4	6	6	145·5	2	0	8
1900–4	466·1	11	2	2	182·1	4	13	3	287·0	4	19	0	186·0	2	7	1
1905–8	519·3	11	16	8	222·7	5	13	6	387·9	6	5	5	253·5	2	19	7

II.—Table of Net or Special Imports of Manufactured Goods.

Annual Average	Mln. £	£	s.	d.	Mln. £	£	s.	d.	Mln. £	£	s.	d.	Mln. £[5]	£	s.	d.
1875–9	59·3	1	15	4	22·5[4]	0	12	2[4]	—[3]		—[3]		40·2	0	17	4
1880–4	64·7	1	16	9	28·2	0	14	11	42·8	0	18	11	65·8	1	5	1
1885–9	66·8	1	16	6	23·8	0	12	5	43·2	0	18	3	63·8	1	1	9
1890–4	75·7	1	19	8	24·6	0	12	10	44·0	0	17	5	66·4	1	0	5
1895–9	94·3	2	7	2	25·2	0	13	0	49·1	0	18	3	58·3	0	16	3
1900–4	113·4	2	14	1	32·4	0	16	7	57·0	0	19	8	78·6	0	19	11
1905–8	124·8	2	16	11	41·6	1	1	2	77·8	1	5	2	109·0	1	5	8

III.—Table of Net or Special Exports.

Annual Average	Mln. £	£	s.	d.	Mln. £	£	s.	d.	Mln. £	£	s.	d.	Mln. £	£	s.	d.
1875–9	201·5	6	0	0	138·4	3	14	10	132·3[6]	3	1	5[6]	124·7	2	13	9
1880–4	234·3	6	13	2	138·3	3	13	4	152·8	3	7	8	165·4	3	3	0
1885–9	226·2	6	3	8	132·3	3	9	2	151·0	3	3	10	146·2	2	9	10
1890–4	234·4	6	2	10	136·8	3	11	4	152·5	3	0	5	184·7	2	16	9
1895–9	237·8	5	18	11	144·3	3	14	8	181·3	3	7	5	212·6	2	19	5
1900–4	282·7	6	14	9	168·6	4	6	4	235·6	4	1	3	292·3	3	14	0
1905–8	368·5	8	7	11	207·8	5	5	11	311·5	5	0	8	359·3	4	4	5

IV.—Table of Net or Special Exports of Manufactured Goods.

Annual Average	Mln. £	£	s.	d.	Mln. £	£	s.	d.	Mln. £	£	s.	d.	Mln. £	£	s.	d.
1875–9	178·1	5	6	0	69·2[4]	1	17	5[4]	—[3]		—[3]		26·0	0	11	3
1880–4	206·4	5	17	3	73·1	1	18	9	91·2	2	0	4	30·6	0	11	8
1885–9	196·9	5	7	7	70·0	1	16	7	98·0	2	1	5	31·9	0	10	10
1890–4	199·1	5	4	5	73·6	1	18	4	98·6	1	19	1	38·8	0	11	11
1895–9	199·6	4	19	10	79·5	2	1	2	116·9	2	3	5	61·6	0	17	2
1900–4	224·7	5	7	1	94·6	2	8	5	154·2	2	13	2	99·8	1	5	3
1905–8	294·7	6	14	4	121·3	3	1	10	213·5	3	9	0	145·2	1	14	2

[1] Value of imports less value of re-exports.
[2] Net imports in 1890 and subsequent years.
[3] Cannot be given.
[4] Average of the four years 1876–9.
[5] Total imports of manufactured goods prior to 1890; net imports of manufactured goods in 1890 and subsequent years. The difference between the total imports and the net imports of manufactured goods in the year 1890 amounted to approximately 0·7 million £.
[6] These particulars are not strictly comparable with those for subsequent years. The difference in basis is believed to be small.

STATEMENT SHOWING FOR THE UNITED KINGDOM, BY THE METHOD OF INDEX NUMBERS, THE FLUCTUATION IN THE WHOLESALE PRICES OF CERTAIN PRINCIPAL ARTICLES AND A COMBINED INDEX NUMBER FOR FORTY-FIVE PRINCIPAL ARTICLES IN EACH OF THE YEARS 1871–1908. (See par 61, p. lix.)

Prices in the Year 1900 *are taken as* 100.

(From Statistical Tables and Charts relating to British and Foreign Trade and Industry. [Cd. 4954] 1909.)

Years	Coal	Raw Cotton	Raw Flax	British Wheat	Foreign Wheat	British Oats	Foreign Oats	Maize	Rice
1871	58·3	135·1	121·2	210·5	174·1	143·1	146·6	169·0	133·2
1872	93·9	162·6	135·0	211·8	182·6	131·8	139·7	155·8	130·7
1873	124·0	153·7	128·9	218·0	191·3	144·5	154·7	155·2	129·7
1874	102·8	139·0	125·9	207·1	178·7	164·0	172·6	185·9	135·0
1875	79·3	133·1	136·9	167·8	156·0	163·0	167·0	174·7	117·0
1876	65·4	115·9	142·7	171·5	153·4	149·3	158·2	140·4	118·4
1877	60·8	112·2	127·4	210·8	183·7	147·4	148·4	142·2	137·9
1878	56·6	107·3	123·9	172·4	161·6	138·4	137·0	132·7	137·0
1879	52·2	105·7	116·8	162·8	155·3	123·7	128·2	119·3	132·7
1880	53·0	112·7	119·1	164·7	162·9	131·3	137·0	131·9	124·4
1881	53·5	112·2	105·9	168·4	162·4	123·7	140·5	136·7	112·9
1882	54·4	112·3	100·0	167·5	156·9	124·2	129·6	157·1	104·3
1883	55·7	111·4	103·0	154·5	144·3	121·8	127·1	143·5	107·2
1884	55·6	109·1	105·1	132·5	123·7	115·2	124·6	129·5	106·4
1885	53·5	109·8	107·4	122·0	115·1	117·1	125·0	118·5	102·2
1886	50·4	95·5	107·2	115·2	111·0	108·1	113·1	107·9	97·8
1887	49·6	96·2	93·8	120·7	112·5	92·4	92·5	106·4	97·6
1888	50·1	99·1	87·7	118·3	112·9	95·3	94·0	119·3	97·5
1889	60·9	101·1	92·3	110·5	113·1	109·9	107·3	104·2	106·8
1890	75·0	102·3	86·7	118·6	114·7	105·7	117·9	99·8	111·9
1891	72·4	99·1	90·4	137·5	130·6	113·7	126·5	137·8	118·0
1892	65·9	91·6	88·6	112·4	112·6	112·8	122·8	117·1	116·2
1893	59·1	93·0	96·2	97·8	94·7	106·6	118·2	105·5	102·6
1894	63·0	79·1	95·7	84·8	78·7	97·2	100·0	98·9	99·6
1895	55·8	74·4	88·1	85·8	81·0	82·5	92·1	101·1	95·4
1896	52·8	88·7	94·3	97·2	91·0	83·9	92·3	80·0	97·4
1897	53·4	80·1	91·9	112·1	109·6	96·2	96·2	75·2	106·8
1898	59·3	68·9	83·6	126·3	117·9	104·7	108·1	86·8	115·3
1899	63·7	73·0	83·3	95·7	98·4	96·7	103·3	91·0	113·9
1900	**100·0**	**100·0**	**100·0**	**100·0**	**100·0**	**100·0**	**100·0**	**100·0**	**100·0**
1901	83·1	98·6	117·2	99·4	97·4	104·7	108·4	105·9	95·8
1902	73·8	97·3	115·5	104·3	98·4	114·7	122·1	115·8	83·7
1903	70·1	107·3	108·0	99·4	99·9	97·6	100·6	109·5	97·0
1904	66·7	119·9	118·1	105·3	103·1	92·9	101·5	105·0	87·2
1905	63·4	101·5	111·5	110·5	106·3	99·1	105·8	115·2	90·3
1906	65·5	119·2	117·6	105·3	103·4	105·7	113·8	108·1	92·3
1907	76·5	126·8	107·2	113·6	113·1	107·6	123·8	120·2	106·8
1908	76·5	116·1	99·6	118·9	123·5	101·4	119·9	135·0	99·1

STATEMENT SHOWING FOR THE UNITED KINGDOM, BY THE METHOD OF INDEX NUMBERS, THE FLUCTUATIONS IN THE WHOLESALE PRICES OF CERTAIN PRINCIPAL ARTICLES AND A COMBINED INDEX NUMBER FOR FORTY-FIVE PRINCIPAL ARTICLES IN EACH OF THE YEARS 1871–1908.

***Prices in the Year* 1900 *are taken as* 100.**

(From Statistical Tables and Charts relating to British and Foreign Trade and Industry. [Cd. 4954] 1909.)

Year	Potatoes	Beef	Bacon	Tea	Petroleum	Hewn Fir	Hides	Caoutchouc	General Index Number for Forty-five Articles
1871	163·9	111·2	117·9	192·5	313·8	159·1	121·1	76·9	136·0
1872	182·5	114·7	98·2	196·5	310·9	163·0	138·5	82·4	145·8
1873	193·8	126·7	97·9	195·2	273·2	176·6	142·9	81·5	152·7
1874	179·4	123·3	109·6	199·1	212·4	179·9	147·0	75·5	148·1
1875	173·2	127·6	125·3	195·9	183·0	157·1	140·9	75·2	141·4
1876	191·8	124·1	128·0	192·3	260·6	159·1	126·7	71·1	138·0
1877	197·9	122·4	114·7	187·1	240·7	155·2	125·1	68·3	141·6
1878	185·6	124·1	92·5	179·0	183·9	135·7	118·6	64·4	132·6
1879	203·9	113·8	82·3	171·9	146·7	118·2	116·6	79·4	126·6
1880	194·8	122·4	95·9	157·7	154·9	134·4	126·3	103·5	129·6
1881	179·0	113·8	109·9	150·1	151·2	135·7	128·7	96·3	127·3
1882	169·9	124·1	127·1	147·3	132·3	139·0	127·5	114·4	128·4
1883	181·9	125·9	127·2	145·9	141·3	134·4	128·7	117·1	126·8
1884	147·4	119·0	118·0	137·9	148·2	119·5	129·1	84·0	114·7
1885	146·4	108·6	97·1	141·2	142·3	116·2	127·5	80·8	107·7
1886	141·4	100·0	90·4	137·8	134·6	102·6	119·8	83·8	101·6
1887	147·6	91·4	101·1	123·9	124·7	96·8	110·1	83·7	99·6
1888	136·1	101·7	107·3	128·7	124·7	103·2	104·5	85·2	102·7
1889	136·1	100·0	99·7	126·3	115·5	114·9	101·6	81·4	104·0
1890	125·4	100·0	88·2	124·7	104·8	105·8	98·0	90·9	104·0
1891	160·0	101·7	90·8	125·3	94·3	97·4	98·0	88·3	107·4
1892	134·0	98·3	97·9	117·9	86·2	97·4	92·7	80·5	101·8
1893	131·1	98·3	127·0	114·1	75·3	90·9	93·5	83·4	100·0
1894	136·5	93·1	105·0	112·3	70·0	87·0	87·9	79·5	94·2
1895	146·2	93·1	93·5	112·8	87·2	88·3	89·9	80·9	91·0
1896	104·1	91·4	82·7	111·8	90·2	92·2	92·3	85·1	88·2
1897	107·4	93·1	84·9	109·6	82·4	93·5	93·1	84·3	90·1
1898	136·9	87·9	86·6	106·9	78·2	95·5	95·1	93·2	93·2
1899	111·3	94·8	85·8	103·3	87·4	94·2	93·1	96·8	92·3
1900	**100·0**	**100·0**	**100·0**	**100·0**	**100·0**	**100·0**	**100·0**	**100·0**	**100·0**
1901	109·3	94·8	112·8	89·8	91·8	94·8	100·8	91·8	96·9
1902	94·8	101·7	126·4	84·3	83·7	89·0	104·5	90·8	96·5
1903	109·8	96·6	126·5	90·3	85·1	90·9	108·5	101·9	96·9
1904	124·7	94·8	112·8	84·8	88·7	85·7	106·9	114·0	98·3
1905	104·1	94·8	111·3	84·8	83·0	87·7	113·0	119·4	97·6
1906	101·0	94·8	126·6	86·7	89·7	89·6	123·1	102·7	100·5
1907	105·2	96·6	132·5	95·2	91·6	92·2	132·0	119·3	105·7
1908	113·4	98·3	122·0	93·2	88·9	87·7	119·0	107·0	102·8

Average Price of Wheat per Imperial Quarter and Rate of Import Duty from 1870, the First Year in which Wheat was Admitted into the United Kingdom Free of Duty. (From [Cd. 4954] 1909.)

Years	United Kingdom: 'Gazette' Average of British Wheat	United Kingdom: Imported Wheat	United Kingdom: Import Duty	France (Official Average): Average Price	France: Import Duty	Germany: Average Price[4]	Germany: Import Duty	United States (Average Price of Winter Wheat at New York Market): Average Price	United States: Import Duty
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
1870	46 11	45 1	Free	...	1 0½	43 8	Free	37 1	6 10½
1871	56 8	50 9	"	59 8	"	50 2	"	49 6	"
1872	57 0	53 3	"	53 11	"	51 9	"	51 1	"
1873	58 8	55 9	"	59 7	"	56 6	"	53 8	"
1874	55 9	52 1	"	58 5	1 1	51 5	"	45 2	"
1875	45 2	45 5	"	45 0	"	41 11	"	40 6	"
1876	46 2	44 8	"	47 11	"	45 0	"	41 1	"
1877	56 9	53 6	"	54 7	"	49 3	"	52 11	"
1878	46 5	47 1	"	49 5	"	43 3	"	42 4	"
1879	43 10	45 3	"	51 6	"	41 11	2 2	40 3	"
1880	44 4	47 6	"	51 8	"	46 10	"	43 8	"
1881	45 4	47 4	"	51 8	1 0½	47 1	"	45 4	"
1882	45 1	45 9	"	44 11	"	44 7	"	43 11	"
1883	41 7	42 0	"	44 3	"	39 7	"	40 5	"
1884	35 8	36 1	"	41 4	"	37 0	"	33 6	"
1885	32 10	33 7	"	38 3	5 2	34 8	6 6½	33 2	"
1886	31 0	32 4	"	38 6	"	33 7	"	30 5	"
1887	32 6	33 9	"	41 2	8 8	35 2	"	30 7	"
1888	31 10	32 11	"	43 9	"	37 3	10 10½	33 5	"
1889	29 9	32 11	"	42 1	"	39 2	"	30 4	"
1890	31 11	33 5	"	44 1	"	41 2	"	33 9	"
1891	37 0	38 1	"	47 10	5 2	47 6	"	37 7	8 7
1892	30 3	32 10	"	41 6	8 8	40 6	7 7½	31 3	"
1893	26 4	27 7	"	37 9	"	32 6	"	25 5	"
1894	22 10	22 11	"	34 6	12 2	28 11	"	21 0	20% *ad val.*
1895	23 1	23 7	"	32 9	"	30 0	"	23 0	"
1896	26 2	26 6	"	33 4	"	32 9	"	26 10	"
1897	30 2	31 11	"	43 9	"	35 5	"	32 10	8 7
1898	34 0	34 4	"	45 8	"[3]	39 10	"	32 9	"
1899	25 8	28 8	"	34 11	"	33 2	"	27 4	"
1900	26 11	29 2	"	33 8	"	32 1	"	27 8	"
1901	26 9	28 5	"	35 3	"	34 8	"	27 7	"
1902[1]	28 1	28 8	...	37 9	"	35 2	"	28 9	"
1903[1]	26 9	29 1	...	39 8	"	33 2	"	29 4	"
1904	28 4	30 0	Free	37 11	"	36 2	"	38 1	"
1905	29 8	31 0	"	40 10	"	36 7	"	35 4	"
1906	28 3	30 2	"	41 0	"	37 3	11 10[5]	29 9	"
1907	30 7	32 11	"	40 7[2]	"	43 1	"	33 1	"
1908	32 0	36 0	"	38 5[2]	"	43 8	"	36 1	"

[1] A duty of 1*s.* 0½*d.* was levied from April 15, 1902, to June 30, 1903.
[2] Average of monthly quotations published in the Journal of the Board of Agriculture and Fisheries.
[3] Wheat was admitted free of duty from May 4 to June 30, 1898.
[4] Official average, Prussia.
[5] From March 1, 1906.

Meat Supply of the United Kingdom (in Millions of Cwts. and Percentage of Total Supply). (From [Cd. 4954] 1909.)

Period	Home Produce		Imported		Total	Per Head of Population: Home Supply	Per Head of Population: Imported	Per Head of Population: Total
	Mil. Cwts.	%	Mil. Cwts.	%	Mil. Cwts.	Lbs.	Lbs.	Lbs.
1890-1-1893-4	25·5	66·6	12·8	33·4	38·2	74·7	37·5	112·2
1894-5-1898-9	24·0	58·0	17·4	42·0	41·5	67·3	48·8	116·1
1899-1900-1903-4	25·0	55·1	20·4	44·9	45·4	66·8	54·3	121·1
1904-5-1907-8	25·0	53·7	21·6	46·3	46·6	63·8	55·1	118·9

AVERAGE WAGES IN DIFFERENT PARTS OF THE WORLD.

The following table is compiled chiefly from the volumes of United States Consular Reports, issued under the title of 'Labour in Foreign Countries.'[1] It is impossible to suppose that the figures here given represent actual averages, but there will no doubt be a sufficient approximation to the truth to illustrate the differences affecting production under one head. The figures refer to the year 1884 or 1885.

WAGES OF ARTISANS.[2]

—	Bricklayers, per week	Engravers, per week	Printers, per week	Telegraph Operators, per week	Hodmen, per week
		s. d.	s. d.	s. d.	s. d.
England and Wales	30s. 2d.	33 7	28 6	30 6	20 0
Germany	17s. 0d.	20 6	—	20 6	11 6
France	23s. 0d.	29 6	26 6	27 6	12 6
Belgium	18s. 3d.	25 6	23 9	25 6	13 0
Switzerland	20s. 10d.	25 3	23 9	—	12 0
Russia	17s. 3d.	18 8	—	—	9 10
Italy[3]	—	—	—	—	10 6
Mexico	17s. to 28s.	—	—	—	—
British Guiana	24s. 0d.	—	—	33 6	10 6
Rio de Janeiro	27s. 0d.	—	—	43 0	18 7
London	33s. 9d.	34 0	29 2	32 0	18 4
Chicago	96s. 0d.	96 0	72 0	—	42 0
New York	80s. 0d.	64 0	52 0	48 0	44 0
Montreal	72s. to 84s.	—	48 0	46 0	30 0

AGRICULTURAL WAGES.

Hamilton (Ontario), 11s. to 14s. per week, with board. Montreal, 23s. per week and house rent. Mexico, 4s. to 18s. 6d., with rations. Venezuela, 16s. to 26s., without board, in the vicinity of towns. Rio de Janeiro, 12s. and food. Argentine Republic, 15s. to 22s. 6d. per week, with board (much higher in harvest). Peru (Callao), 12s., and rice rations. British Guiana, 8s. 6d. to 18s., with lodging. Smyrna, 17s. 6d., without board. Ceylon, 1s. 4d. to 4s. 3d., without board. Victoria (Colony of), 21s., with board. New Zealand, 23s., with board.

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[1] Apart from its statistics, this work is full of interesting information with regard to the subject which forms its title.

[2] At the Witwatersrand goldfields in 1887 the approximate rates of wages were, for first-class blacksmiths, 20s. per day; carpenters, 16s.; miners, 10s.; Kaffir day labourers, 7s. 6d. per week; Kaffir night labourers, 10s. per week. (*Board of Trade Journal*, No. 17, p. 661.) 'The rates of skilled labour [in Victoria] prior to the gold-mining were about 6s. or 8s. a day; they rapidly advanced during two years, and, for a short time, stonemasons and some others were receiving 40s. a day. After a rapid fall, there has been until lately some degree of steadiness at about one-third of these singularly high rates.' (*Journal of the Statistical Society*, vol. xxiv., pp. 199–200, June 1861.)

[3] According to a Report from the British Secretary of Legation at Rome (published in the *Board of Trade Journal*, No. 7, p. 151), the wages in Italian textile factories varied from 6d. (for women in certain employments) to 4s. a day, the highest wages being earned by first-class weavers. Mr. Wardle, in his Report on the Silk Industry to the Royal Commission on Technical Education, states that women silk-workers in Piedmont do not earn much more than 6d. a day, and some earn even less.

AREA, POPULATION, AND EXPORTS OF THE PRINCIPAL COUNTRIES AND COMMERCIAL ISLANDS OF THE WORLD.

The population according to the latest census, where there are census returns, the exports generally for the same or later years.

Country	Year	I. Area	II. Ratio to G.B.	III. Population in Millions	IV. Density	Exports V. Total Val. Mln. £	Exports VI. Val. per head, £	
1. Algeria	1900	184	2+	4·7	26	9·2	1·9	1
2. Argentine Republic	1900	1,136	13−	4·8	4	30·9	6·4	2
3. *Australia* [1]	*1901*	*3,071*	*35*	*3,805*	*1·2*			3
4. Austria-Hungary (including Bosnia and Herzegovina)	1900	265	3	47·0	177	80·9	1·7	4
5. Belgium	1900	11·4	[illegible]	6·7	589	76·9	11·5	5
6. Bolivia	1900	984	11	1·9	2	3·3	1·8	6
7. Brazil	1890	3,218	36−	14·3	5	26·8	1·9	7
8. *Canadian Dominion*	*1901*	*3,049*	*34*	*5·4*	*2*	*40·4*	*7·5*	8
9. *Cape Colony and Dependencies*	*1904*	*277*	*3*	*2·4*	*2*	*25·0*	*10·4*	9
10. *Ceylon*	*1901*	*253*	[illegible]	*3·6*	*141*	*6·9*	*1·9*	10
11. Chile	1901	308	3[illegible]	3·1	10	12·9	4·1	11
12. China Proper	1902	1,532	17	407	266	34·1	0·1	12
13. Cuba	1899	44	[illegible]	1·6	36	12·8	8·2	13
14. Denmark (excluding Faroe Islands & Iceland)	1901	14·8	[illegible]+	2·4	165	15·3	6·2	14
15. Egypt (excluding Desert)	1897	13	[illegible]	9·7	751	17·3	1·8	15
16. *Fiji Islands*	*1901*	*7·7*	[illegible]−	*0·1*	*15*	*0·5*	*4·7*	16
17. France	1901	207	2[illegible]	39·0	188	160·5	4·1	17
18. Germany	1900	209	2[illegible]	56·4	270	237·6	4·2	18
19. Greece	1896	25	[illegible]	2·4	97	3·5	1.4	19
20. *Guiana, British*	*1901*	*104*	*1*[illegible]	*0·3*	*3*	*1·8*	*6·1*	20
21. Holland	1899	12·5	[illegible]	5·1	406	131·9	25·9 [2]	21
22. India (including Burma)	1901	1,767	20	294	167	15·3	0·5	22
23. *British India (including Burma)*	*1901*	*1,087*	*12*[illegible]	*232*	*213*	*90·9*	*0·4*	23
24. Italy	1901	111	1[illegible]	32·5	293	57·9	1·8	24
25. Japan (excluding Formosa and Pescadores)	1900	147·7	1[illegible]	44·8	304	21·0	4·7	25
26 Java and Madura	1900	50·5	[illegible]	28·7	569	—	—	26
27. *Mauritius*	*1901*	*0·7*	[illegible]	*0·4*	*536*	*1·9*	*4·9*	27
28. Mexico	1900	767	8[illegible]	13·6	18	21·5	1·6	28
29. *Natal (including Zululand)*	*1902*	*29·2*	[illegible]−	*1·0*	*33*	*7·2*	*7·5*	29
30. *Newfoundland*	*1901*	*42*	[illegible]+	*0·2*	*5*	*1·7*	*7·9*	30
31. *New Zealand* [2]	*1901*	*104*	*1*[illegible]	*0·8* [2]	*7*	*12·7*	*16·4*	31
32. Norway	1900	124	1[illegible]	2·2	18	8·4	3·7	32
33. Persia	1900	628	7	9·5	12	2·9	0·3	33
34. Peru	1896	714	7[illegible]	3	4	3·4	1·1	34
35. Philippine Islands	1900	114	1[illegible]	8	70	4·8	0·6	35
36. Portugal	1900	34·3	[illegible]	5	146	6·9	1·3	36
37. Roumania	1899	50·7	[illegible]	5·9	117	6·0	1·0	37
38. Russia in Europe (including Finland)	1897	2,080	23[illegible]	106	51	78·9	0·7	38
39. Servia	1900	18·6	[illegible]+	2·5	134	2·7	1·1	39
40. Spain	1900	195	2[illegible]	18·6	97	30	1·6	40
41. *Straits Settlements*	*1901*	*1·5*	[illegible]	*0·6*	*388*	*25·5*	*44·6*	41
42. Sweden	1900	172·9	2−	5·1	30	21·7	4·2	42
43. Switzerland	1900	16	[illegible]	3·3	208	35·4	10·7	43
44. Tunis	1900	51	[illegible]	1·9	37	1·7	0·9	44
45. Turkey (including Asiatic Turkey & Tripoli)	1897	1,115	12[illegible]	24·9	22	13·9	0·6	45
46. Bulgaria (including E. Roumelia)	1900	38	[illegible]+	3·7	98	2·2	0·6	46
47. *United Kingdom*	*1901*	*121*	*1*[illegible]	*41·5*	*342*	*299·9*	*7·2*	47
48. United States (excluding Alaska)	1900	2,935	32[illegible]	76·3	26	280	3·7	48
49. Uruguay	1901	72	[illegible]	1·0	13	5·5	5·8	49
50. Venezuela	1894	599	6[illegible]	2·4	3	2·9	1·2	50
51. *West Indies, British*	*1901*	*12·1*	[illegible]+	*1·6*	*132*	*6·3*	*4·0*	51

Explanations relating to the Table on the opposite page.

I. Area in thousands of square miles.

II. Ratio to Great Britain (in round numbers 90,000 square miles). The sign (+) indicates that the figure expressing the ratio is somewhat too small; the sign (−) that it is somewhat too large.

III. The population given is either that at the last census or is based on official estimates. The star (*) denotes vague estimates.

IV. Density of population (number of inhabitants per square mile).

V. Value of total exports (in most cases special exports, inclusive of bullion and specie) in millions sterling. In several cases it has been found impossible to give the exports for the same year as is given for the population.

VI. Value of exports per head in pounds and decimals of a pound.

The members of the British Empire are printed in italics.

This table must not be taken as indicating by itself the relative prosperity of different countries with regard to commerce. A boast is often made of the high value of foreign commerce per head. In reality this is nothing to boast of. It may indicate only a very one-sided development of industry; and conversely, a low value per head may indicate only that a country is relatively self-sufficing, supplying itself with an ample variety of commodities. In the Australasian Colonies, the Argentine Republic, and Uruguay, the high value of the foreign commerce per head shows a one-sided devotion to agriculture (including pasturage), or agriculture and mining; in the United Kingdom it indicates a one-sided development of manufacturing industry. The high value in Holland is partly explained by the note below (n. 2), that in Switzerland is largely due to the fact of that country having, relatively to area, a very long land frontier bordering on populous countries. In the United States the value of the exports per head is moderate. The country as a whole is tolerably self-sufficing. But if we had the means of stating the external commerce of such western states as Texas, Kansas, Iowa, and California (all of which had a larger population in 1900 than the most populous of the Australian States in 1901), we should no doubt find that that commerce was, relatively to population, quite as great as that of the States referred to.

[1] Commercial statistics for the whole Commonwealth are not yet available; the following figures show the value (mill. £) of exports from each State in 1902:- Victoria 18·2, New South Wales 17·2, Queensland 9·2, South Australia 7·7, West Australia 9·1, Tasmania 3·2.

[2] In Holland colonial produce is included under the head of special commerce.

[3] Excluding Maoris.

INDEX

The numbers refer to pages, not paragraphs; those in black type are to passages that contain more than an incidental mention of the subject of the reference.

In the case of entries consisting of two or more words, the first word determines the alphabetical order among the entries composed of single words. Thus, names beginning with Black, New, Port, Saint (St.), and the like, are all entered together under Black New, &c.

Printed by BALLANTYNE, HANSON & Co.
Edinburgh & London